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Correlation between RISK-PCI Score and Shock Index with in-Hospital and Long-Term Major Adverse Cardiovascular Events and Mortality after Primary Percutaneous Coronary Intervention in Patients of Acute Myocardial Infarction

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Abstract

Background: ST-segment elevation myocardial infarction (STEMI) remains a significant cause of death globally despite modern evidence-based medical therapies and widespread use of percutaneous coronary intervention (PCI).After percutaneous coronary intervention, the in-hospital mortality rate for STEMI is 3-4% and may approach 10% annually. In addition, individuals with STEMI had a higher risk of haemorrhage and acute renal damage, both of which were linked to worse outcomes. This research aimed to assess the predictive performance of the RISK-PCI score and the shock index (SI) in predicting major adverse cardiovascular events (MACE) and death after Primary Percutaneous Coronary Intervention. One hundred patients were studied using a variety of methods at the cardiology departments at the National Heart Institute and Benha University Hospital. History and clinical data, electrocardiogram, laboratory testing, coronary angiogram, and primary percutaneous coronary intervention were all performed on every patient. The results indicated that there was a statistically significant rise in the RISK-PCI score between patients who had MACE and those who did not (in the hospital and over the long term). There was no statistically significant difference between the two groups in terms of RISK-PCI score, despite the fact that the mean score was greater for patients who had MACE and mortality during in-hospital follow-up compared to those in the Long term group. Risk-PCI was significantly correlated with major adverse cardiac events (MACE), including death both during and after hospitalisation. Sensitivity and specificity of risk PCI score in identifying MACE incidence, long term mortality, and in hospital mortality were 95.8% and 85.7%, respectively; sensitivity and specificity of Shock Index was 85.7 and 20.7 was achieved for long term mortality and in hospital mortality. As a result, it can be concluded that the Risk PCI score and the Shock Index both have very significant predictive values for the incidence of MACE, as well as for long-term mortality and in-hospital mortality. The predictive values of major adverse cardiac events (MACEs), long-term mortality, and in-hospital mortality are all improved significantly when the Risk PCI score is embedded with the Shock Index. Whether a unique risk assessment approach may further enhance patients' prognoses after initial PCI is an issue that requires further research.

Key words: RISK-PCI Score , Shock Index, - in-Hospital - Long-Term Major Adverse Cardiovascular Events- Mortality,- Primary Percutaneous Coronary Intervention, - Acute Myocardial Infarction

1. Introduction

Diseases of the heart and blood arteries are collectively known as cardiovascular disease (CVD), with CHD (coronary heart disease) and ACS (acute coronary syndrome) being two examples (ACS).

Chronic heart disease is a leading cause of mortality and disability in industrialised nations. [1]

Plaque fissure, plaque erosion, functional modifications of epicedial coronary arteries, and vasoconstriction of the microcirculation are all potential causes of acute coronary syndrome [2].

The complicated clinical situation of ST-elevation myocardial infarction (STEMI) necessitates prompt diagnosis, quick therapeutic therapy, and early risk assessment [3].

Most patients experiencing an ST-elevation myocardial infarction (STEMI) are treated with primary percutaneous coronary intervention (pPCI) as a reperfusion treatment.[4]

Patients with STEMI still have a poor prognosis, despite the low rate of major adverse cardiovascular events (MACE) following modern primary PCI [5]

A patient's risk profile must be identified and quantified in order to properly guide medical treatment, including the length and severity of hospitalisation and the optimization of medication during follow-up [6]

Although baseline risk factors are the most important determinant of prognosis following STEMI, echocardiographic and angiographic data are also strong predictive indicators [7]

Clinical, laboratory, echocardiographic, and angiographic data are all accounted for in risk scores, which are mathematical models.

They may be used to calculate the potential danger of a certain event occurring in a certain time frame, whether it short or long [3]

Patients with STEMI may be stratified using a variety of risk ratings, the majority of which fall into one of two categories: those created during the thrombolytic period, and those produced during the percutaneous coronary intervention era [8].

Patients with STEMI who are given pPCI may benefit from a unique, easy-to-use score called RISK-PCI, which predicts the likelihood of major adverse cardiovascular events (MACE) and mortality in the next 30 days [9].

In patients with AMI, the shock index (SI) is a significant predictor of MACEs [10].

This study aimed to assess the predictive performance of the RISK-PCI score and shock index (SI) in predicting major adverse cardiovascular events (MACE) and mortality in the in-hospital and long-term follow-up of

STEMI patients treated with primary Percutaneous Coronary Intervention (pPCI).

2. Patients and Methods

2.1Technical Design:

Study design:

The study was carried out in the Cardiology Departments in National Heart institute & Benha University hospital from April 2020 to March 2022, 100 patients enrolled in the study with Acute STEMI who were admitted through the outpatient department for evaluation and were eligible and planned for primary PCI.

Patients follow up was done during the In-hospital period then Long-time period (along 1 years after discharge) to determine the MACE during this period.

Inclusion criteria:

All Patients presenting with Acute ST segment elevation Myocardial infarction (**STEMI**) or new onset left bundle branch block (LBBB) that undergoing primary PCI as a revascularization treatment irrespective of age, gender, race and clinical severity.

Exclusion criteria:

1. Patients with stable angina, unstable angina, and non-ST-segment elevation Myocardial infarction (NSTEMI).
2. Patient with STEMI who had received thrombolytic therapy.
3. Non-cardiac conditions that interfered with compliance of the treatment protocol.
4. Coexistent conditions associated with a limited life expectancy in the short term.
5. Patients refused participation in the study.

2.2Operative Design:

All patients were subjected to:

History:

- Full history taking was done with emphasis on Age, Sex, history of hypertension or diabetes & history of previous PCI or CABG.

Clinical examination:

- Complete general examination .
- Local Cardiac examination to assess signs of pulmonary congestion, valvular affection & Killip class.
- Patients were classified regarding KILLIP class as:
- Class I: no clinical signs of heart failure
- Class II: rales or crackles in the lungs, an S3, and elevated JVP.
- Class III: frank acute pulmonary edema.
- Class IV: cardiogenic shock [11]

ECG: was done for all patients to detect Acute STEMI , New LBBB & life threatening arrhythmia:

ST segment-elevation myocardial infarction (STEMI): STEMI was diagnosed by, New ST elevation at the J point in two contiguous leads of >0.1 mV in all leads other than leads V2-V3 ,for leads V2-V3 the following cut points apply: ≥0.2 mV in men ≥40 years, ≥0.25 mV in men <40 years, or ≥0.15 mV in women [12]

- Presence of new left bundle branch block: Rhythm was of super-ventricular origin, QRS Duration greater than 120 ms, Lead V1 should have either a QS or a small r wave with large S wave, Lead V6 should have a notched R wave and no Q wave [14]
- Rhythm and rate: The leads I, II, aVF, and V1 require inspection for an accurate interpretation of rhythm. For calculation of rate, the number of either small or large squares between an R-R interval was first calculated. The rate was calculated by either dividing 300 by the number of big squares or 1500 by the number of small squares between two R-waves [15].

Laboratories: was performed for all patients to detect:

The Creatinine clearance (CrCl) was calculated using Cockroft–Gault formula [16]

- CrCl (male) = ([140-age] × weight in kg) / (serum creatinine × 72).

- CrCl (female) = ([140-age] × weight in kg) / (serum creatinine × 72) x0.85.

If creatinine clearance was:

- ≥ 90: normal creatinine clearance
- 60-89: mild renal impairment
- 30-59: moderate renal impairment
- < 30: severe renal impairment [17]

Random blood glucose test:

The patient was considered diabetic if the Random blood glucose was at or above 11.1mmol/L (≥200 mg/dl)**.**

Total leucocytic count (TLC):

Mainly to detect Leukocytosis (i.e., the increase in the number of White Blood Cells to more than 11000/mm3) or Leucopenia or (i.e., the Decrease in the no. of White Blood Cells to less than 1500 /mm3) [18]

Echocardiography

Echocardiographic examination was performed between 48 h and 72 h following pPCI and left ventricular ejection fraction (EF) was assessed according to the modified Simpson method, and assessment of any mechanical complication. the biplane method of disks (modified Simpson's rule) is the currently recommended 2D method to assess left ventricle (LV) volume and ejection fraction (EF) by tracing endocardial border in both apical four-chamber and two-chamber views in end-systole and end-diastole, to determine the volume of the left ventricle, EF= [SV/EDV] x 100 [19]

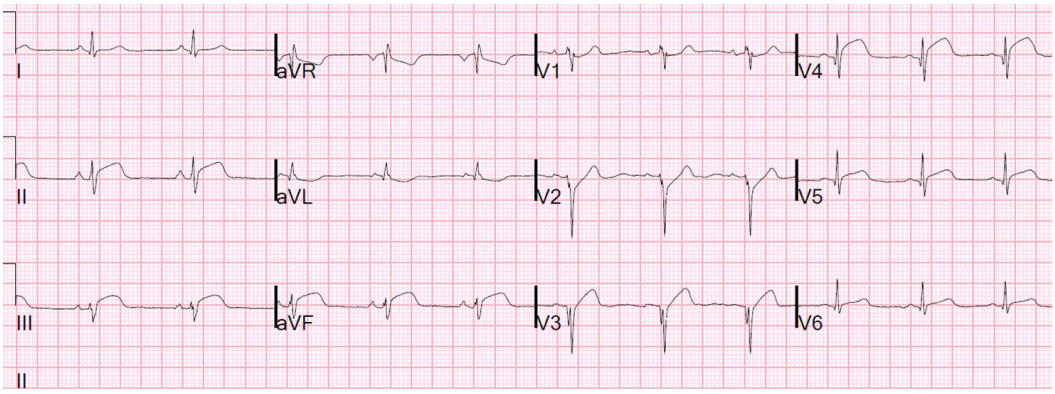

Fig. (1) ECG findings in STEMI **[**13]

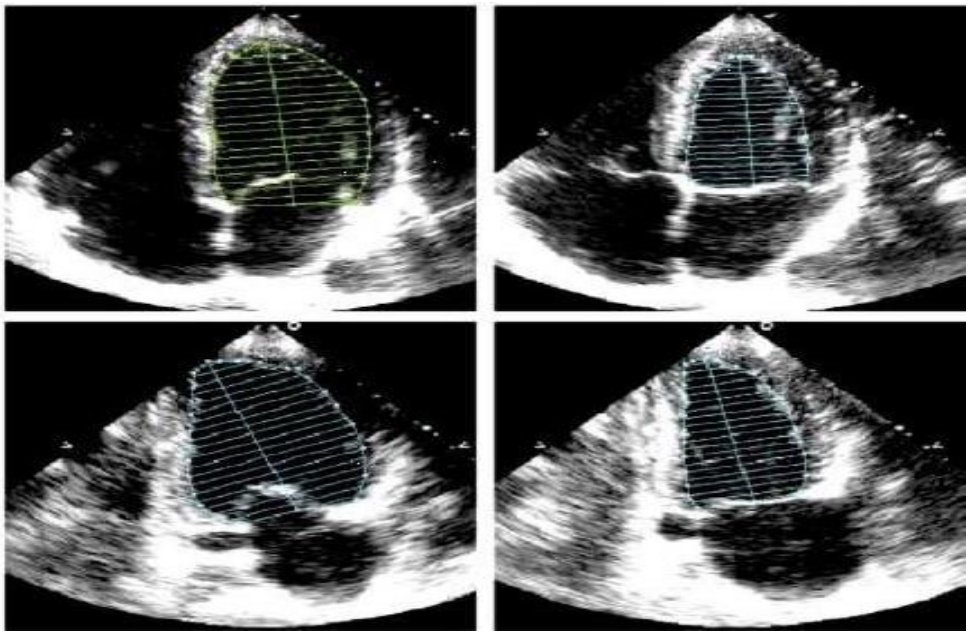

Fig. (2) 2-D measurements for volume calculations using the modified Simpson's (biplane method of disks) method. [19]

Coronary angiography and primary PCI:

The femoral approach was used in coronary angiography. The images were taken using digital subtraction angiography (DSA) technique, which was obtained by taking the images at 2 to 3 frames per second. The degree of stenosis or other abnormalities was identified by visual assessment.

The following data were collected:

Culprit lesion(IRA): Infarct related artery (IRA) was identified and its severity was calculated as:

-Total when there was no ante-grade flow across the lesion.

-Subtotal when there was penetration without perfusion. Contrast material passes beyond the area of obstruction but fails to opacify the entire coronary bed distal to the obstruction for the duration of the cine angiographic filming sequence. [20]

- Number of diseased vessels: Total number of vessels having lesions was calculated. Coronary lesions other than culprit one were considered significant if any stenosis of > 50% in at least one major epicardial coronary artery [21]
- TIMI flow: assessment before and after primary PCI.
- The TIMI flow was divided according to the degree of perfusion into:
- Grade 0: complete occlusion of IRA (No flow).

Grade 1: some penetration with contrast material beyond the point of obstruction (No perfusion).

Grade 2: penetration with contrast material beyond the point of obstruction with delayed flow compared to normal (partial perfusion).

Grade 3: Normal flow of contrast material (full perfusion). [22]

- Thrombus burden: heavy thrombus burden or low thrombus burden.
- Any complication:
- Dissection.

- No-reflow: failure of blood to re-perfuse to the ischemic area after the physical obstruction has been removed [23].

Calculation of RISK-PCI score & Shock Index (SI):

RISK-PCI:

The RISK-PCI score included 12 variables as follows: patient age, prior MI, anterior MI, acute bundle branch block and high-grade AV block, laboratory findings (leukocyte counts, hyperglycemia, and creatinine clearance), echocardiographic evaluation of left ventricular ejection fraction (EF), angiographic assessment of the IRA diameter, and initial and post-procedural TIMI flow grade. The total score ranges from 0 to 20. The sum of weighted points for 12 independent predictors was calculated to define the total score for each patient with a range of 0–20. Risk strata with low (0–2.5 points), intermediate (3–4.5 points), high (5–6.5 points), and very high (≥7 points) [24]

Shock Index (SI)

The shock index (SI) was a bedside assessment defined as heart rate divided by systolic blood pressure, with a normal range of 0.5 to 0.7. In this study, the value of SI was measured in the emergency department [25]

Administrative design:

- The purpose of the research was explained to all patients.
- Informed consent from all patients was included in the study.
- Participants' rights to decline to participate and to withdraw from the research once it had started.
- The patient's confidentiality was saving.

Risk factor	Points
Age >75 years	1
Prior infarction	1.5
Anterior infarction	1
Complete AV block*	2
Acute BBB*	3.5
Leukocyte $>12.0^{10-9}$/L*	1
Glucose ≥6.6 mmol/L*	1
Creatinine clearance*	
≥90 ml/min	0
60–89 ml/min	1
<60 ml/min	2
LV ejection fraction <40%	1.5
Reference diameter ≤2.5 mm	1
Preprocedural TIMI flow 0	1
Postprocedural TIMI flow <3	3.5
*At admission	

Fig. (3) Risk-PCI score. [24]

3. Results

Most patients had normal sinus rhythm, only one patient had atrial fibrillation and 4 patients had a complete heart block. And according to STEMI site , most patients 71% had anterior STEMI, 25% had inferior STEMI and only 4% had Lateral STEMI.

Table (1) ECG results among studied patients

Variable	Value (N = 100) N(%)
Rhythm	
AF	1 (1)
CHB	4 (4)
NSR	95 (95)
STEMI site	
Anterior STEMI	71 (71)
Lateral STEMI	4 (4)
Inferior STEMI	25 (25)

Most patients 76% had only one diseased vessel, LAD was the most culprit artery, heavy thrombus burden was in 35% of patients and noreflow was in 8% of them.

Table (2) Coronary angiographic results among studied patients

Variable	Value (N = 100) N(%)
Diseased vessels number	
1	76 (76)
2	15 (15)
3	9 (9)
Culprit	
LAD	69 (69)
LAD, LCX	4 (4)
LCX	6 (6)
RCA	21 (21)
Heavy Thrombus Burden	35 (35)
No-Reflow	8 (8)
Pre TIMI	
0	50 (50)
1	39 (39)
2	11 (11)
Post TIMI	
1	2 (2)
2	17 (17)
3	81 (81)

The mean Shock index was 0.66 while the mean RISK-PCI score mean was 4.07.

Table (3) Shock index and RISK-PCI score among studied patients

Variable	Mean ± SD
Shock index	0.66 ± 0.19
RISK-PCI score	4.07 ± 2.65

The MACE & mortality were seen in 28 cases, In-hospital MACE was 18% and mortality reached 5%, long term MACE reached 14% and long-term Mortality reached 2%.

Table (4) Follow Up MACE (rather than mortality) & mortality results

Variable	Value (N = 100) N(%)
All cases	28 (28)
In hospital MACE	18 (18)
In hospital Mortality	5 (5)
Long term MACE	14 (14)
Long term Mortality	2 (2)

According to In-hospital follow up, MI was seen in 2 cases, heart failure was seen in 13 cases, stroke was seen in one case and CV death was seen in 5 cases died in hospital.

Table (5) In hospital follow up MACE & mortality results

Variable	Value (N = 18) N(%)
MI	2 (11.11)
Heart failure	13 (72.22)
stroke	1 (5.56)
CV death	5 (27.78)

Regarding long term follow up, MI was seen in 2 cases, heart failure was seen in 9 cases, stroke was seen in one case and CV death was seen in 2 cases.

Table (6) Long term follow up MACE & mortality results

Variable	Value (N = 14) N(%)
MI	2 (14.29)
Heart failure	9 (64.29)
Stroke	1 (7.14)
CV death	2 (14.29)

Regarding to comparison between MACE & Non-MACE groups, patients in the MACE group were significantly older compared to those in the non-MACE group ($p<0.05$), and also smoker patients were significantly mush higher incidence of MACE than non-smoker patients ($p<0.05$), and patient with previous PCI were significantly higher in MACE group ($p<0.05$), and according to Killip class , patents with Killip class 3 & 4 during 1st presentation , had mush higher incidence of MACE during the follow up period ($p<0.05$).

Table (7) Risk Factors among MACE group & Non-MACE group

Variable	Non MACE & mortality (N = 72) N(%)	MACE & mortality (N= 28) N(%)	P-Value
Age	53.64 (10.14)	60.43 (15.89)	<0.05[1]
Gender			
Male	55 (76.39)	11 (39.29)	<0.05[2]
Female	17 (23.61)	17 (60.71)	
Smoking	31 (43.06)	5 (17.86)	<0.05[2]
HTN	39 (54.17)	17 (60.71)	>0.05[2]
DM	24 (33.33)	10 (35.71)	>0.05[2]
Previous PCI	3 (4.17)	5 (17.86)	<0.05[2]
Previous CABG	1 (1.39)	0	-
Killip class			
1	67 (93.06)	13 (46.43)	<0.05[2]
2	5 (6.94)	7 (25)	
3	-	4 (14.29)	
4	-	4 (14.29)	

There was significant increase in TLC in MACE group than non-MACE group ($p<0.05$), and high significant decrease in CrCl in MACE group & mortality in comparison to patient in the other group ($p<0.001$).

Table (8) Laboratory results among MACE group & non-MACE group

Variable	Non MACE & mortality (N = 72) N(%)	MACE & mortality (N= 28) N(%)	P-Value
CrCl	95.43 (18.84)	74.75 (25.7)	<0.001[1]
RBG	213.32 (95.92)	249.68 (120.04)	>0.05[1]
TLC	9293.75 (4429.22)	13871.43 (5694.37)	<0.05[1]

Most of patients were a normal sinus rhythm in the two groups, while the MACE group had 4 patients with complete heart block that considered statistically significant difference between the two groups ($P<0.05$) and the Ejection fraction (EF) was much lower in MACE group and statistically we had a highly significant difference regarding EF among the two groups ($P<0.001$).

Table (9) ECG and Echocardiographic results among MACE group & non-MACE group

Variable	Non MACE & mortality (N = 72) N(%)	MACE & mortality (N= 28) N(%)	P-Value
Rhythm			
AF	1 (1.39)	-	<0.05
CHB	-	4 (14.29)	
NSR	71 (98.61)	24 (85.71)	
STEMI site			
Anterior STEMI	53 (73.61)	18 (64.29)	>0.05
Lateral STEMI	1 (1.39)	3 (10.71)	
Inferior STEMI	18 (25)	7 (25)	
EF	58.22 (7.74)	45 (11.96)	<0.001

According to coronary angiographic results during the primary PCI, the MACE group of patients showed a significantly higher number of diseased vessel than non-MACE group (P<0.05), also there was significant increase in thrombus burden in group suffered from MACE (P<0.05), and the noreflow phenomena incidence was higher in MACE group of patients than non-MACE group (P<0.05).

Patients with post TIMI 1, 2 showed a significantly higher incidence of MACE than patients with post TIMI 3 after primary PCI (P<0.05).

Table (10) Coronary angiographic results among patients In MACE group & non-MACE group

Variable	Non MACE & mortality (N = 72) N(%)	MACE & mortality (N= 28) N(%)	P-Value
Diseased vessels number			
1	61 (84.72)	15 (53.57)	<0.05
2	7 (9.72)	8 (28.57)	
3	4 (5.56)	5 (17.86)	
Culprit			
LAD	51 (70.83)	18 (64.29)	>0.05
LAD, LCX	1 (1.39)	3 (10.71)	
LCX	6 (8.33)	0	
RCA	14 (19.44)	7 (25)	
Thrombus Burden	12 (16.67)	23 (82.14)	<0.05
No-Reflow	2 (2.78)	6 (21.43)	<0.05
Pre TIMI			
0	27 (37.5)	23 (82.14)	<0.05
1	34 (47.22)	5 (17.68)	
2	11 (15.28)	0 (0)	
Post TIMI			
1	1 (1.39)	1 (3.57)	<0.05
2	4 (5.56)	13 (46.43)	
3	67 (93.06)	14 (50)	

Regarding to RISK-PCI score, patients that classified as high and very high score showed a higher incidence of MACE during the follow up period than patients were classified as low and intermediate score, So there was a high statistically significant difference between the two groups (P<0.001).

Table (11) RISK-PCI score among patients of MACE group & non-MACE group

Variable	Non MACE & mortality (N = 72) N(%)	MACE & mortality (N= 28) N(%)	P-Value
Low	36 (50)	0	0.00027
Intermediate	30 (41.67)	1 (3.57)	
High	5 (6.94)	13 (46.43)	
Very High	1 (1.39)	14 (50)	

According to relation between MACE, Mortality & Risk-PCI score, there was a much higher Risk-PCI mean in all MACE & mortality cases with a high statistically significant difference (P<0.001). also, the sensitivity of Risk-PCI score in prediction of MACE & mortality was higher in the in-hospital period than long term period of follow up.

Sensitivity and specificity of Risk-PCI score in detecting MACE occurrence, Long term mortality and In hospital mortality was 95.8, 14.5, 85.7, 16.3, 94.4 and 20.7 respectively. Sensitivity and specificity of Shock Index in detecting MACE occurrence, Long term mortality and In hospital mortality was 95.8, 82.9, 92.9, 84.9, 94.4 and 82.9. Sensitivity and specificity of EF in detecting MACE occurrence, Long term mortality and In hospital mortality was 75, 97.4, 78.6, 94.2, 61.1 and 98.8 respectively.

As regarding to the cut-value, the incidence of MACE & mortality during the follow up period was increased if the Risk-PCI score more than 4.25, shock index more than 0.5 and ejection fraction EF lower than 35.5%.

Table (12) Sensitivity and Specificity of Risk PCI, Shock index and EF in detecting MACE and mortality of included patients.

	Cut off	MACE occurrence		Long term mortality		In hospital mortality	
		Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	Specificity
Risk PCI score	>4.25	95.8	14.5	85.7	16.3	94.4	20.7
Shock Index	>0.5	95.8	82.9	92.9	84.9	94.4	82.9
EF%	<35.5	75	97.4	78.6	94.2	61.1	98.8

Case Presentation

Age: 64 years old. **Sex:** male**.**

Risk factors: hypertensive and smoker**.** **Killip class:** 1**.**

History: patient presented by severe typical chest pain, started from 4 hours before admission**.**

Laboratory: CrCL:84, RBG: 210 mg/dl, TLC:13500.

ECG: Anterior STEMI.

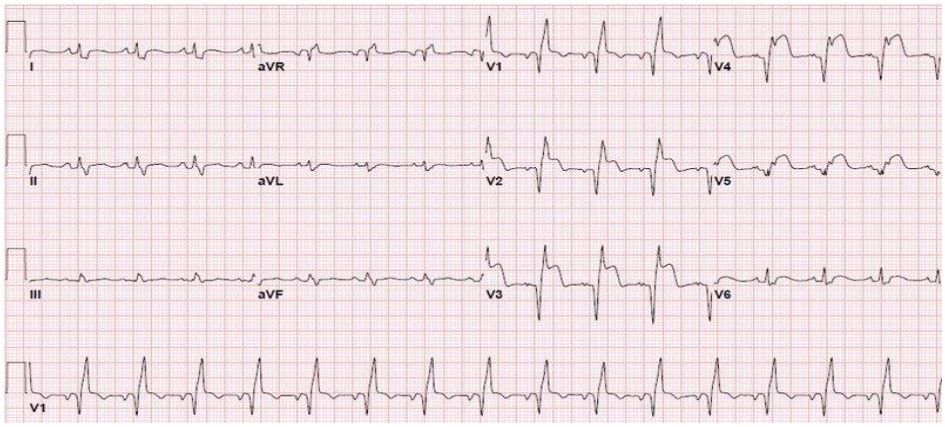

Fig. (4) ECG shows ST segment elevation from V1-V5

Echocardiography : EF:68% , hypokinesia in anterior wall , mild MR.

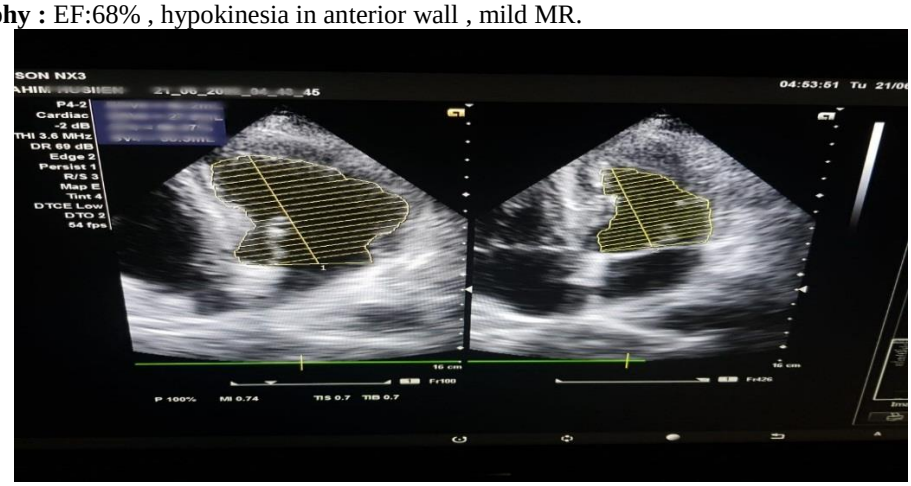

Fig. (5) Ejection fraction EF=68% by Simpson method

Coronary angiography and primary PCI:

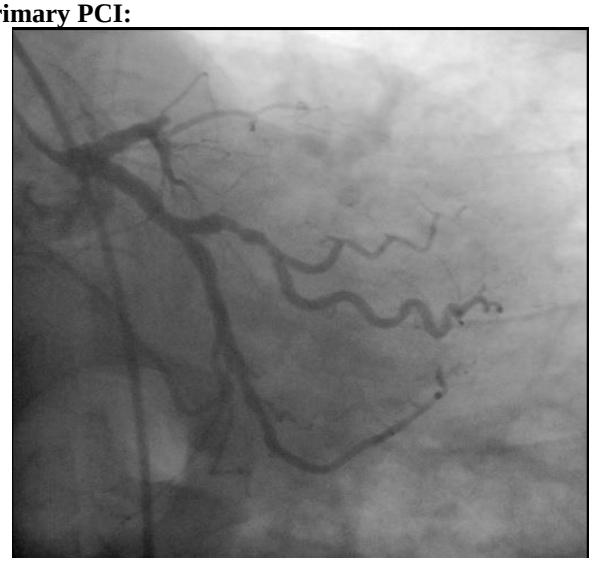

Fig. (6) RAO caudal view shows proximal total occlusion in LAD with TIMI 0

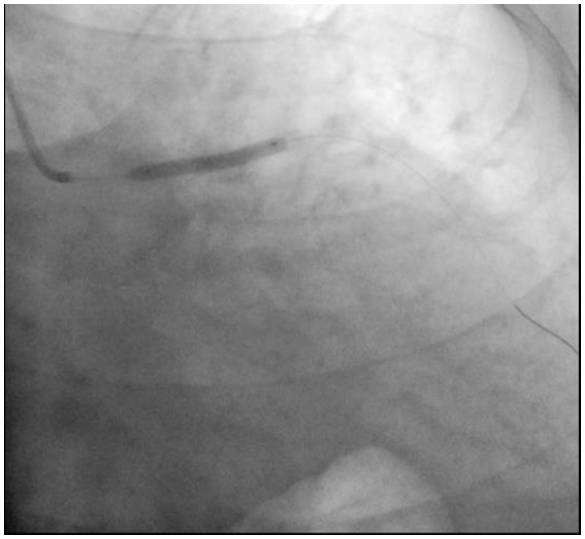

Fig. (7) RAO caudal view shows primary PCI in proximal LAD

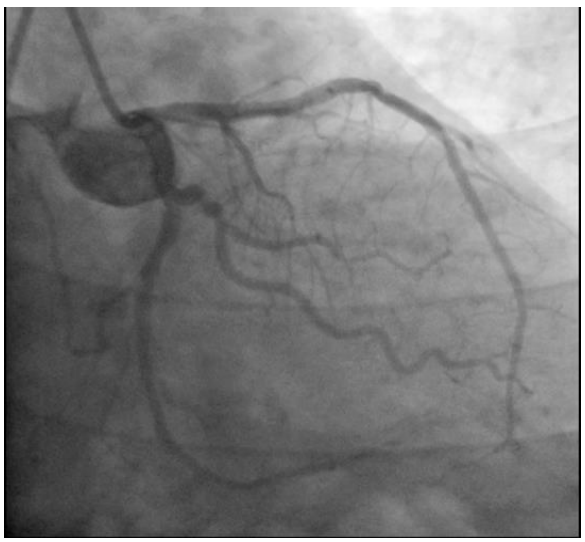

Fig. (8) RAO caudal view shows successful PCI to LAD with TIMI 3

- **Culprit:** LAD
- **Number of diseased vessels:** 1 (LAD)
- **Complication:** No
- **Pre TIMI:** 0
- **Post TIMI:** 3

Risk PCI score: 5 (high)
Shock Index: .64
In-hospital MACE: no complications.
Long term MACE: no complications.

4. Discussion

The majority of patients had sinus rhythm, one patient had atrial fibrillation, and four patients had full heart block according to the findings of the ECG studies among the participants included in the study.

Seventy-one percent of patients with STEMI had an anterior STEMI, twenty-five percent had an inferior STEMI, and four percent had a lateral STEMI.

Ikeda, [26] highlighted that, the ECG is the noninvasive inexpensive main technique which may be utilised to identify the heart problems.

Savelloni et al., [27] stated that, a total of 1120 ECGs from patients with acute myocardial infarction and 10 452 control ECGs, recorded in an emergency room with computerised ECGs, (76.4%) were normal sinus rhythm, (15.2%) heart block and (8.4%) atrial fibrillation.

When it came to angiographic findings, 76% of patients had a single problematic vessel, 35% had a substantial thrombus load, and 8% saw no reflow. The LAD was the most common culprit artery.

In a similar vein, [28] .'s angiographic data found that the culprit lesion was most often situated in the left anterior descending coronary (51.9%), and was in the left main (9.8%) of instances.

Left anterior descending (LAD) was 166 (49.2%), right coronary artery (RCA) was 126 (37.3%), left circumflex artery (LCX) was 34 (10.3%), and Other was 12 (3.5%), as reported in a previous research by [29].

According to our findings, the average shock index was 0.66 and the standard deviation was 0.19.

Long-term MACE was at 12% and death at 2%, while in-hospital MACE was at 14% and fatality at 5%. The mean RISK-PCI score was 4.07 with a standard deviation of 2.65.

Two patients had MI, thirteen patients had heart failure, one patient had a stroke, and five patients died from cardiovascular causes while in the hospital.

Two patients had a myocardial infarction (MI), nine patients had heart failure, one patient had a stroke, and two patients died of cardiovascular causes during long-term follow-up.

The discrimination of the RISK-PCI score to predict 1-year MACE and death was pretty strong, as was shown in a previous research by [24], which corroborated our findings.

The 1-year MACE c-statistics was 0.78 (95% CI 0.73-0.79, p 0.001), the 6-year MACE c-statistics was 0.75 (95% CI 0.68-0.75, p 0.001), the 1-year mortality c-statistics was 0.87 (95% CI 0.84-0.89, p 0.001), and the 6-year mortality c-statistics was 0.83 (95% CI 0.

The admission shock index was shown to be independently linked with in-hospital mortality in a retrospective analysis of 644 patients treated with primary percutaneous coronary intervention (92% of patients) or rescue PCI (7% of patients) by [30].

Also, in a prior systematic study titled "The predictive significance of shock index for the outcomes of acute myocardial infarction patients"

Zhang et al., [10] observed that, According to the inclusion criteria, 8 studies enrolling 20,404 patients were finally included in the systematic review and meta-analysis.

Among the eight studies, two focused only on in-hospital mortality, two on short-term unfavourable outcomes, two on long-term MACE, [31] one analysed both in-hospital and long-term mortality, and one measured both short-term and long-term mortality.[32]

For this reason, there were 3, 3, and 4 studies analysing in-hospital mortality, short-term, and long-term unfavourable outcomes, respectively.

According to [27], unlike most of the other risk scores that pertain to patients with STEMI, the RISKPCI score takes into account echocardiographic and angiographic parameters in addition to baseline clinical ones.

Risk scores that include both clinical and angiographic data have been shown to have better prognostic accuracy than risk scores that incorporate either clinical or solely angiographic variables, as reported by [7].

Age, gender, smoking status, history of percutaneous coronary intervention (PCI), and Killip class were significantly different between participants who had MACE and death and those who did not.

Age, female number , smoking, prior PCI and Killip class “3,4”, all were substantially greater in patients suffering from MACE & death. [33] indicated that, the mean age of individuals was 59.7 ± 11.4 years in group I, and 59.7 ± 9.7 years in group II.

Of the total number of participants, there were 25 men and 6 females in Group I (n = 31), and 141 males and 36 females in Group II (n = 177).

There was no statistically significant difference in the distribution of age or gender between the two groups.

There was no statistically significant difference in the rates of hypertension (13 cases, 41.9%), diabetes mellitus (7 cases, 22.6%), and hyperlipidemia (10 cases, 32.2%), which were all found in Groups I and II.

In contrast, 24 of the patients in Group I (77.4%) and 76 of the cases in Group II (42.9%, P = 0.011) were found to be smokers.

There was a statistically significant rise in TLC and a very significant drop in CrCl in patients with MACE & mortality compared to those without the condition, as measured by laboratory, ECG, and Echocardiographic data.

Ejection fraction (EF) was also significantly lower in the MACE group, with a huge statistical difference between the two groups (P0.001).

Mrdovic et al. [34] found that among patients with MACE and mortality, there was a significant increase in Creatinine clearance (190; 18.9%) and heart rate (76; 69,88%) but a decrease in Anemia (71; 7.1%), Time from Symptoms (3.2; 4.4), and Killip > 1 Heart Failure (80; 7.9%) during laboratory investigations.

Patients with MACE & death had a higher prevalence of diseased arteries, a heavier thrombus load, and a no-reflow phenomena on coronary angiograms compared to those who did not have MACE & mortality.

Mrdovic et al. [34] observed similar results, saying that patients with MACE and death were more likely to have thrombus burdens of 501 (49.8%), RCA 417 (41.4%), LAD 405 (40.2%), and diseased vessels of 432 (42.9%), 307 (30.5%), and 268 (26.6%).

There was a statistically significant rise in the RISK-PCI score between patients who had MACE and those who did not (in both the in-hospital setting and over the long term).

There was no statistically significant difference between the two groups in terms of RISK-PCI score, despite the fact that the mean score was greater for patients who had MACE and mortality during in-hospital follow-up compared to those in the Long term group.

In a recent study [24] showed that, the RISK-PCI score remained an independent predictor for 1-year MACE (HR 1.24, 95% CI 1.18–1.31, $p < 0.001$), 6-year MACE (HR 1.22, 95% CI 1.16–1.28, $p < 0.001$), 1-year mortality (HR 1.21, 95% CI 1.13–1.29, $p < 0.001$), and 6-year mortality (HR 1.23, 95% CI 1.15–1.31, $p < 0.001$).

Risk-PCI was significantly correlated with major adverse cardiac events (MACE), including death both during and after hospitalisation.

Sensitivity and specificity of risk PCI score in identifying MACE incidence, long term mortality, and in hospital mortality were 95.8% and 85.7%, respectively; sensitivity and specificity of Shock Index was 85.7 and 20.7 was achieved for long term mortality and in hospital mortality.

Along with our results was a previous study aimed to evaluate the prognostic performance of the RISK-PCI score in predicting MACE and mortality in the long-term follow-up of STEMI patients treated with pPCI., [24]showed that, the RISK-PCI score demonstrates good characteristics in the assessment of the risk for the occurrence of MACE and mortality during long-term follow-up after pPCI. discrimination of the RISK-PCI score to predict 1-year and 6-year MACE and mortality was good: for 1- year MACE c-statistic 0.78, for 6-year MACE c-statistic 0.75, for 1-year mortality c-statistic 0.87, and for 6-year mortality c-statistic 0.83.

5. Conclusion

The Risk PCI score and the Shock Index both exhibit high predictive values for the incidence of MACE, as well as for in-hospital mortality and long-term mortality.

The predictive values of major adverse cardiac events (MACEs), long-term mortality, and in-hospital mortality are all improved significantly when the Risk PCI score is embedded with the Shock Index.

Additional research is needed to ascertain if an unique risk score model might further enhance the prognosis of patients following initial PCI.

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