



POST-PCI CLINICAL OUTCOME; CO-RELATION WITH CARDIAC BIOCHEMICAL MARKERS

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ABSTRACT... Introduction: The incidence of creatine kinase-myocardial band (CK-MB) isoenzyme elevation after percutaneous coronary intervention (PCI) ranges from 11% to 35%, including low-level elevations with no associated signs or symptoms as well as large non-Q-wave and Q-wave myocardial infarction. Whereas the deleterious effect on survival of large periprocedural myocardial infarctions have been well documented. Large periprocedural myocardial infarctions, such as those caused by occlusion of a large side branch, flow-limiting dissection, or distal embolization of a large thrombus, would be undesirable and associated with worse subsequent cardiac outcomes. **Objectives:** To correlate the clinical outcome after PCI with cardiac biochemical markers. **Study Design:** Observational follow-up study. **Setting:** Faisalabad Institute of Cardiology, Faisalabad. **Duration of Study with Dates:** Six months (February, 2014 to August, 2014). **Patients and Methods:** Two hundred patients with symptoms of myocardial ischemia proceeding for percutaneous coronary intervention were enrolled in the study. After taking history and clinical examination, the patients divided into two groups: group I and group II. Group I comprised one hundred and fifty patients having normal cardiac enzymes and group II comprised fifty patients having raised cardiac enzymes. **Results:** Out of 50 patients with raised cardiac enzymes 42 (84%) were males and 8 (16%) were females, multi vessel coronary disease (58%), multi vessel PCI (54.3%). Periprocedural complications dissection (6%), side branch compromise (14%), slow flow (10%), no reflow (2%), sub-acute stent thrombosis (4%) occurred in group II as compared to slow flow (1.4%) and sub-acute stent thrombosis (0.7%) in group I. In hospital mortality (2%) in group II while no mortality in group I. On thirty day follow up 32% patients became symptomatic among which 6% developed non ST elevation MI in group II while only 1.4% patients had symptoms of angina in group I. 6% patients needed repeat target lesion revascularization in group II and only 0.7% in group I. **Conclusion:** Patients with raised cardiac enzymes had worse clinical outcome in terms of mortality, myocardial infarction and repeat target lesion revascularization than normal cardiac enzymes.

Key words: Myocardial infarction (MI), Percutaneous coronary intervention (PCI), Cardiac enzyme, Periprocedural myonecrosis

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INTRODUCTION

A large number of PCI procedures including PCI are performed annually worldwide. It also includes primary PCI procedures.¹ After PCI in 10-25% of patients Cardiac biochemical markers are elevated but its significance as periprocedure MI is not known.² Increased risk of mortality with elevated levels of CK-MB after PCI is documented in different studies.³ This adverse relation was also demonstrated in EPIC trial.⁴ Procedural complication including side branch compromization, flow-limiting dissection, or distal

embolization results in worse cardiac outcomes and associated myocardial necrosis may serve as nidus for arrhythmogenesis.⁵ Different studies correlated elevated cardiac biochemical markers with mortality.^{2,6,7}

Worse clinical outcome is expected if CK-MB level is elevated 5 times greater than normal valve which is associated with complication of PCI.⁸ Greater the elevation of cardiac biochemical markers after PCI is associated with greater risk for late cardiovascular mortality.⁹

In Pakistan impact of cardiac enzyme elevation on clinical outcome after PCI has never been studied before, this study is designed to compare the clinical outcome of patients after PCI having normal versus raised cardiac enzymes. This will further risk stratify the patients for aggressive management of the patients having increased levels of cardiac enzymes.

OBJECTIVE

To correlate the clinical outcome after PCI with cardiac biochemical markers.

OPERATIONAL DEFINITIONS

Normal cardiac enzymes

If the cardiac enzymes creatine kinase-MB (CK-MB) isoenzyme levels were below the upper reference limit analyzed by mass CK-MB levels using a dimension RxL/HM analyser (Dade Behring, Glasgow, DE, USA). The upper reference limit for CK-MB will be 5.0 ng/mL.

Raised cardiac enzymes

Elevated CK-MB isoenzyme levels were above the upper reference limit in at least one of the two post-procedural samples six hours apart.

Clinical outcome

Clinical outcome was assessed on follow-up in all patients at 30 days. All clinical end points were entered on proforma on follow-up visits. Patients' clinical condition regarding symptoms of chest pain, shortness of breath was inquired on follow-up. Clinical outcome was divided into primary and secondary endpoints.

1. Primary end point

The primary end point of the study was in-hospital or 30 days mortality.

2. Secondary clinical end points

Includes major adverse cardiac events (MACE) including myocardial infarction, emergent coronary artery bypass surgery, or repeat target lesion revascularization (TLR) at 30 days after the index procedure.

MATERIALS AND METHODS

Setting

Department of Cardiac Catheterization &

Interventional Cardiology and coronary care unit of Faisalabad Institute of Cardiology, Faisalabad.

Duration of Study with Dates

Six months (February, 2014 to August, 2014)

Sample Size

Two hundred consecutive patients undergoing PCI were divided in to two groups:

Group I: 150 patients having normal cardiac enzymes

Group II: 50 patients having raised cardiac enzymes

Sampling Technique

Non probability purposive sampling

Study Design

It was an observational analytical study.

Inclusion Criteria

- Patients with ischemic heart disease undergoing percutaneous coronary intervention.
- Patients of either gender of age range 25-70 years.

Exclusion Criteria

- Myocardial infarction within the previous 24 hours.
- Left ventricular systolic dysfunction (EF < 25%).
- Patients with CK-MB level > 1 times the upper limit of normal in 24h before PCI.

Data Collection Procedures

Patients were included after taking informed consent. Data was collected including baseline characters of study group, risk factors, and angiographic finding prior to PCI. Procedure variable like size and balloon type and size of stent and any complication like dissection, perforation, side branch compromise, and CK-MB levels post procedure was noted. A blood sample was drawn <24 h after the procedure and CK-MB level was measured. The patients were clinical evaluated after 30 days.

Clinical outcome was measured by noting in-hospital mortality and 30 days mortality. Symptoms of chest pain and exertional dyspnea were noted on follow-up and repeat target vessel revascularization or emergent bypass graft surgery were noted.

Statistical Analysis

Statistical analysis was performed using the SPSS (version 10). Mean ± standard deviation (SD) for quantitative variables were calculated. Frequencies and percentages of qualitative variables were calculated. Clinical outcome variable like mortality, Non-ST elevation MI or repeat target lesion revascularization were compared between Group I (Normal cardiac enzymes) vs Group II (raised cardiac enzymes) by Chi Square test. Associations with outcomes will be considered statistically significant if p values are less or equal to (P≤0.05)

RESULTS

After fulfilling inclusion criteria 200 consecutive patients were studied at Faisalabad Institute of Cardiology Lahore. 123 (82%) males and 27 (18%) females included in group I (mean age 53.9 + 9.86 years) while in group II (mean age 56.68 + 12.62 years), there were 27 (84%) males

and 8 (16%) females. (Table-I). Smoking was most frequently observed in 57.3% and 60% in group I and II respectively. Among 371 significant angiographic lesions 159 were confined to left anterior descending, 113 right coronary, 92 left circumflex and 7 ramus intermedius arteries. Patients with moderate dysfunction (20%) and severe left ventricular (2%) were more common in group II than in group I (8.7%) and (0.6%) respectively (Table-II). Multi vessel coronary artery disease (58%) was more in group II than group I (34%) [Table-II]. Total 260 percutaneous coronary interventions were performed among which multiple PCI 54.3% in group II and 34.2% in group I (Tables-II). Bare metal stent and drug eluting stents were used. 51.9% were bare metal stent, 40.8% drug eluting stent while 7.3% lesions were only ballooned.

34% patients had complications in group II while 2.1% in group I. In group II, major side branch was compromised in 14% of patients, PCI was complicated by dissection in 6% patients, slow flow observed in 10%, no reflow in 2% and sub-acute stent thrombosis observed in 4% of patients. In group I, 2.1% patients developed complications among which no flow (1.4%) and subacute stent thrombosis (0.7%) (Table-III).

	Group I (%) [n = 150]	Group II (%) [n = 50]	P value
Gender			
Males	123 (82%)	42 (84%)	
Females	27 (18%)	8 (16%)	
Age (Years)			
30 – 40	12 (8%)	5 (10%)	P<0.05
41 – 50	52 (34.6%)	12 (24%)	
51 – 60	62 (41.3%)	15 (30%)	
61 – 70	24 (16%)	18 (36%)	
Risk factors of ischemic heart disease			
Smoking	86 (57.3%)	30 (60%)	<0.001
Diabetes mellitus	35 (23.5%)	20 (40%)	<0.05
Hypertension	83 (55.5%)	28 (56%)	<0.001
Previous history of ischemic heart disease	33 (22%)	25 (50%)	<0.05
Family history of ischemic heart disease	45 (30%)	20 (40%)	<0.01
Dyslipidemia	62 (41.3%)	26 (52%)	<0.001
Obesity	29 (19.3%)	10 (20%)	<0.01

Table-I. Basic characteristic of (n = 200)

	Group I (%) [n = 150]	Group II (%) [n = 50]	P value
Left Ventricular Function			
Normal EF >55%	54 (36%)	16 (32%)	P>0.05
Mild left ventricular dysfunction EF 40-55%	82 (54.7%)	23 (46%)	
Moderate left ventricular dysfunction EF 30-40%	13 (8.7%)	10 (20%)	
Severe left ventricular dysfunction EF <30%	1 (0.6%)	1 (2%)	
Frequency of coronary artery disease			
Single vessel	99 (66%)	21 (42%)	
Multiple vessel	51 (34%)	29 (58%)	
Frequency of percutaneous coronary intervention			
Single	125 (65.8%)	32(45.7%)	
Multiple	65 (34.2%)	38 (54.3%)	

Table-II. Basic characteristic of (n = 200)

Complication	Group I (%)	Group II (%)
Dissection	-	3 (6%)
Side branch compromise	-	7 (14%)
Any other		
Slow flow	2 (1.4%)	5 (10%)
No flow	-	1 (2%)
Subacute stent thrombosis	1(0.7%)	2 (4%)

Table-III. Frequency of complications (n = 200)

In group II, one patient (2%) died during hospital stay after PCI, 32% patients developed symptoms of angina within 30 days follow up and were treated accordingly. Non-ST segment elevation myocardial infarction observed in 12% patients. Six percent of patients needed repeat target vessel revascularization (Table-IV). In group I, there was no hospital mortality. Only 2 (1.4%) developed symptoms of angina within 30 day follow up. One patient 0.7% underwent repeat target vessel revascularization while other one treated conservatively (Table-IV).

Outcome	Group I (%) (n=150)	Group II (%) [n=50]
In hospital mortality	-	1 (2%)
30 days follow-up		
Symptomatic patient	2 (1.4%)	16 (32%)
NSTEMI	-	6 (12%)
Repeat TLR	1 (0.7%)	3 (6%)

Table-IV. Frequency of outcome (n = 200)

DISCUSSION

Cardiac enzymes elevation caused by complications of PCI is obviously undesirable. Roe et al² analysed 6164 patients of ACS from four randomized trials namely GUSTO-II b, PURSUIT, PARAGONE-A and PARAGONE-B. This study showed worse clinical outcome of patients with raised cardiac enzymes in terms of mortality. Patients with significantly raised CK-MB were comparable regarding age with our study that is 59 years with 57 years. Male population is more 84% in my study as compared to 70.1%. Hypertension and dyslipidemia are comparable 58% and 50.4% with 56% and 52% respectively in this study. Diabetes (40%) and smoking (60%) is more frequent in my study. In-hospital mortality was same 2.4% while it was 2% in our study. Repeat target lesion revascularization was 12.9% while it was 6% in my study however patients were followed up for additional six months.

Abdelmeguid et al¹⁰ studied 4664 patients of ACS who underwent PCI. It was observed that even mild elevation of CK-MB (>2 times ULN) associated with worse clinical outcome in terms of mortality, repeat revascularization. Periprocedural complications like dissection 7.7% and side branch compromise 12.5% reported by Abdelmeguid et al¹¹ are nearly the same in our study, 6% and 14% respectively. Abdelmeguid et al¹⁰ so reported that mortality was 2-3%, target

lesion revascularization was 6-10% and major ischemic events 12%. The results of our study are mortality was 2%, target lesion revascularization 6% and non-ST segment elevation MI 12%.

Atherosclerotic disease burden like multi-vessel disease increases the risk of complications during PCI resulting elevation of cardiac biochemical marker which is always associated with worse outcome. So cardiac enzyme elevations after PCI identifies high-risk patients without an obvious MI.^{12,13} It is suggested that after PCI any degree of CK-MB elevation is associated with adverse prognosis.^{8,14,15,16}

Study Limitations

1. Small cohort of patients.
2. Clinical follow was of short duration.
3. Cardiac enzyme elevation was not categorized into sub groups.

CONCLUSION

After PCI elevated level of cardiac biochemical marker leads to adverse clinical outcome and thus helps in identification of high risk group after PCI.

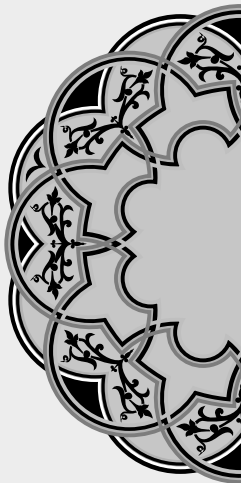
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*“You are never too old to set another goal
or
dream another dream.”*

Les Brown

AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Dr. Muhammad Nazim	Literature review + Final Proof Reading	
3	Dr. Shakeel Ahmad	Data Collection	