Correlation of Cardiac Biomarkers and Post-PCI Clinical Outcome done in Cath. Lab of Rehmatul lil Alameen Institute of Cardiology

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ABSTRACT

Background: Increasing mortality risk is associated with the raised CK-MB levels after PCI. The worse cardiac outcome was due to the procedural complication like side branch compromise, flow-limiting dissection and distal embolization. With increased CK-MB levels there is an expectancy of adverse clinical outcomes five times more than the normal values.

Objective: To determine the correlation of post PCI clinical outcomes with cardiac biomarkers.

Material & Methods: The present study followed, an observational cohort design. Where a cohort of 110 individuals with angiographic proven ischemic heart disease undergoing PCI were recruited. CK-MB levels were assessed after 24 hours of PCI. Then patients were followed-up for 30 days and mortality / morbidity was noted if occurred. Patients with Acute Myocardial infarction (MI) (within the last 24 hours), patients with left ventricular systolic dysfunction and all the pregnant females were excluded from the study.

Results: The study contained a cohort of 110 individuals with ischemic heart disease. The cohort was divided into two groups on the basis of CK-MB levels. All the patients in Group A had CK-MB level below to the aforementioned level whereas it was higher than 5.0 in Group B patients. The group A contained 74 patients while the group B had 36 patients. The mean age of all the participants in Group A was 52.5 $\pm$ 9.9 and in Group B was 55.8$\pm$11.98. Among the post PCI complications in group B, one patient (2.7%) died during hospital stay, 10 (27.8%) of the patients had established symptoms of angina within 30 days follow up and were treated accordingly. Non-ST segment elevation myocardial infarction ((NSTEMI) was observed in 5 (13.8%) of the patients. While 4 (10.8%) patients in group B needed a repeat target vessel revascularization.

Conclusions: We may conclude from our study that elevated cardiac biomarkers after PCI may leads or associated with the worse clinical outcomes. This also helps to identify high-risk post PCI groups.

Keywords: *Diabetes mellitus (DM), Myocardial infraction (MI), Percutaneous coronary intervention (PCI), Mortality, CK-MB levels.*

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INTRODUCTION

A large number of percutaneous coronary intervention (PCI) procedures are performed every year throughout the world. This not only includes, elective PCI but also the primary PCI procedures.[1] In about 10 to 25% of patients, there is an elevation of cardiac biomarkers soon after PCI procedures. The elevated cardiac biomarkers and significance of their association with peri-procedural myocardial infarction (MI) is still not completely established.[2] It has been reported by many studies that raised levels of creatine kinase-myoglobin band (CK-MB) after PCI are associated with increased risk of mortality.[3,4] Similarly, fewer of the clinical trials like EPIC, had completely demonstrated the relation of the elevated CK-MB levels with increased mortality after PCI.[4] It was also reported that the worse cardiac outcome was due to the procedural complication like, pinching of a side branch leading to compromised flow, flow-limiting dissection of the vessel and distal embolization of plaque. Moreover, the raised CK-MB levels are also correlated to the myocardial necrosis, that could be served as nidus for the generation of arrhythmias.[5]

Several available studies highlighted the mortality associated to the elevated cardiac biomarkers in their findings.[2,6,7] There is five times greater risk of having adverse clinical outcomes with increased CK-MB levels than with the normal values. Hence this is highly linked to post PCI complications.[8] The more the post PCI cardiac biomarkers elevation, the greater will be the cardiovascular mortality risk.[9]

In Pakistan, there is limited availability of the studies that were conducted to highlight the impact of increased cardiac enzyme on post PCI clinical outcomes.[10] Even the comparative studies are not available in the region for elevated and normal cardiac enzymes. Therefore, the current study was planned and

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conducted with the chief aim to estimate the correlation of post PCI clinical outcomes with cardiac biomarkers.

MATERIAL AND METHODS

The present study followed, an observational cohort design. Where a cohort of 110 individuals was recruited. The selection was done, from the cardiology department of Rehmatul lil Alameen institute of cardiology. The study duration was of six months, starting from Dec 2016. The venue of the study was cardiology department of Rehmatul lil Alameen institute of cardiology. All the patients of age ranging between 18 to 70 and of any gander with known ischemic heart disease (established by prior coronary angiography) and undergoing PCI were included in this study. Whereas the exclusion criteria include all the patients with Acute Myocardial infarction (MI) (within the previous 24 hours), patients with left ventricular systolic dysfunction and the pregnant females. After written informed consent, all the patients were recruited according to the inclusion / exclusion criteria. The demographic information with necessary diagnostic and clinical history was collected from all the patients.

From all the patients, a baseline blood sampling for CK-MB was done through specified protocol. A second sample for CK-MB was repeated 24 hours after PCI in all patients. All the concentrations were noted. Moreover, the information related to various risk factors was collected like, findings of angiography prior to PCI. The information related to procedures like, size and type of balloon, type of stent, and any encountered complication i.e. dissection, perforation etc. were also noted. For all other diagnostic values including the aforementioned, the standard operating procedures (SOPs) were strictly followed. Additionally, the entire clinical outcomes were noted such as, within 30 days mortality, exertion dyspnea, symptom of chest pain and acute coronary syndrome. The ethical approval was taken from the hospital ethical Committee before the start of the study.

Normal cardiac enzymes (Group A): 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.

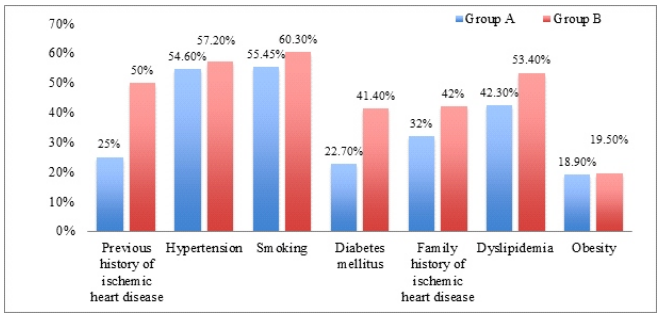
Raised cardiac enzymes (Group B): Elevated CK-MB isoenzyme levels were above the upper reference limit in at least one of the two post-procedural samples six hours apart.

The information collected from patients were entered electronically, stored and analyzed later by using SPSS version 18. Descriptive statistics were applied by calculating mean and standard deviation. Frequency distribution and percentages were performed for all qualitative variables like mortality, chest pain, ACS, Non-ST elevation MI etc. additionally Chi square test was performed to correlate the clinical outcomes in both the groups with the cardiac biomarkers. All the P values, which were less than 0.05, were considered statistically significant in all inferential statistics.

RESULTS

The study contained a cohort of 110 individuals with ischemic heart disease. The cohort was divided into two groups on the basis of post PCI CK-MB levels. The group A included the patients with normal CK-MB levels while in group B there were patients having raised levels of CK-MB after PCI. The upper reference limit for CK-MB was 5.0 ng/ml. There were 74 patients in group A and the group B contained 36 patients. The mean age of all the patients in Group A was 52.5±9.9 years and in Group B the age was 55.8±11.98 years. More on the patients baseline characteristics were given in table 1. The risk factors for Ischemic heart disease were given in figure 1.

Figure 1: A detailed view of Ischemic heart disease risk factors.



Out of the total PCI, 22 (61.1%) in group B and 27(36.4%) in group A were multi-vessel PCI, while 47 (63.6%) in group A and 14 (38.9%) in group B were single vessel PCI. Two types of stents were used (Bare metal and drug eluting). The usage percentages were 67.5% and 30.5% for drug eluting and bare metal respectively, while 2.0% lesions were only ballooned. The summary of the complications is given in table 2.

Table 1: Baseline characteristic for all the participants.

Baseline characteristic	Group A	Group B	Significance
N	74	36	
Mean age	52.5 ± 9.9	55.8±11.98	0.45
Gander			
Male	63(85.1%)	29(80.5%)	0.65
Female	11(14.9%)	7(19.5%)	0.58
Age wise distribution			
Below and equal 25	4(5.4%)	2(5.5%)	<0.05
26-35	4(5.4%)	3(8.3%)	
36-45	23(31.1%)	8(22.2%)	
46-55	31(41.9%)	15(41.6%)	
56-65	8(10.8%)	6(16.6%)	
Above 65	4(5.4%)	2(5.5%)	

Table 2: A detailed summary of complications

Complications	Group A	Group B
Dissection		2(5.5%)
Side branch compromise		6(16.6%)
Slow flow	1 (1.35%)	4(11.1%)
No flow		1(2.7%)
Sub acute stent thrombosis	1 (1.35%)	2(5.5%)

Among the post PCI complications in group B (with elevated cardiac enzymes) one patient (2.7%) died during hospital stay, 10 (27.8%) of the patients had established symptoms of angina within 30 days follow up and were treated accordingly. Non-ST segment elevation myocardial infarction (NSTEMI) was observed in 5(13.8%) of the patients. Four patients in group B needed a repeat target vessel revascularization. Whereas in Group A, non of the hospital mortality was observed, the symptoms of angina with in a month follow up was developed in only 2 patients and one patient underwent the repeat target vessel revascularization. There exists a significant association in the post PCI complications and the CK_MB levels (normal or elevated). (P value < 0.05)

DISCUSSION

This study was planned to determine or assess the correlation of post PCI clinical outcomes with cardiac biomarkers, we not only correlate the two but also estimate the related complication in terms of percentages.

Because of increased risk of complications, it is highly undesirable to have elevated cardiac enzymes after a PCI. One of the study conducted by Roe et al, had scrutinized over 6000 post PCI patients in four randomized trails and had shown the worse clinical outcomes especially increased risk of mortality associated with the raised cardiac enzymes.[2] The age between both groups in our study is comparable especially in those cases where there was increased level of CK-MB. We also have observed in our study that males are in higher number than females. The results for hypertension, dyslipidemia were also comparable to the above-mentioned study results. We have frequently observed high number of cases with smoking and diabetes in our study. And the in hospital mortality is slightly more to the study findings i.e. 3.4%. Although we found less number or repeat target lesion revascularization in our findings.

In another study conducted by Abdel meguid et al, they investigated 4664 ACS patients, in whom PCI was done afterwards.[11] They highlighted that even a mild elevation in CK-MB was linked to the worse clinical outcome in terms of mortality and repeated revascularization. Other complications like dissection leading to slow flow and side branch compromise were reported same as of our study findings. We found lower incidence of mortality, target lesion revascularization and NSTEMI in our study. This finding was also supported by other published literature.[11, 12]

We have observed in our findings that the complication risk during PCI may results in the elevation of cardiac biomarker, and this rise is linked or associated to post PCI worse outcomes. Due to the fact that the cardiac enzyme increased or elevated once after PCI, is involved in identification of patients with high risks with no MI.[13,14] Any elevated degree of CK-MB is strongly linked or correlated to the adverse prognosis.[8,15-17] The study findings may be more significant with large sample size, with longer clinical flow and sub grouping of elevation of cardiac enzymes.

CONCLUSIONS

We may conclude from our study that elevated cardiac biomarkers of post PCI may leads or associated with the worse clinical outcomes. This also helps to identify high-risk post PCI groups.

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