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ORIGINAL ARTICLE

Frequency of Acute Stent Thrombosis after Primary Percutaneous Coronary Intervention in Patients with ST-Elevation Myocardial Infarction

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ABSTRACT

Objective: To determine the frequency of acute stent thrombosis after primary percutaneous coronary intervention in patients with ST-elevation myocardial infarction.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Department of Cardiology, National Institute of Cardiovascular Disease Hospital, Karachi from 30th 2017 to 31st December 2017.

Methodology: One hundred and sixty three patients will undergo primary percutaneous coronary intervention and stent either drug-eluting stents (coated with medication) or bare-metal stent was placed. Patients who developed sudden onset of typical chest pain, indicating acute ischemia in the distribution of the target vessel (in which stent was placed), in these patient's angiography was done (relooked) if it showed complete occlusion within the stented segment with evidence of thrombus, patient was labeled as having acute stent thrombosis.

Results: There were 117 (71.7%) males and 46 (28.23%) were females with mean age of 51.78±13.09 years. Drug-eluting stents was placed in 87(53.37%) and bare metal was placed in 76(46.63%) patients. Positive acute stent thrombosis was 2 (1.23%).

Conclusion: The frequency of acute stent thrombosis after primary PCI was found to be 1.23%.

Keywords: ST-elevation myocardial infarction (STEMI), Percutaneous coronary intervention (PCI), Acute myocardial infarction, Stent thrombosis

INTRODUCTION

Myocardial infarction is a typical introduction of coronary artery sickness. The WHO assessed in 2004, that 12.2% of overall mortality was from ischemic coronary illness.[1] International data available reflect these statistics. European records from the latter half of this decade suggests that the annual incidence of any acute myocardial infarct varied from 90-312 per 100,000 inhabitants per year across the continent.[2] For cases of STEMI alone, the incidence of hospital admissions across Europe ranged from 44-142 per 100,000 inhabitants per year. In the United States, CHD caused approximately one in six deaths in 2006.[3]

Worldwide, in excess of 30 lac cases have STEMI and 40 lac have NSTEMIs annually.[4] ST-elevation myocardial infarctions happen about twice as regularly in male compared to female.[5] Deaths from ischemic heart disease (IHD) have eased back or declined in most big league salary nations, albeit cardiovascular incidents actually represented one out of three of all deaths in the USA in 2008.[6] For instance, mortality from cardiovascular sickness have diminished very nearly a third somewhere in the USA.[7] Ischemic heart disease is turning into frequent reason for mortality in the developing countries.[8]

Stent thrombosis (ST) after PCI is a rare yet conceivably deadly complication.[9] The rate of ST in the international data differs from under 1% to over 5%.[10-16] Indeed, even in investigations with more up to date age drug-eluting stents, the ST rate differs altogether from one another in literature.[17,18] This variety relies on various variables including the meaning of ST, the sorts of stent utilized, the investigation time, the sort and term of antiplatelet treatment, the extent of stable versus acute cases, and variety in hazard factor profile and clinical act of various topographical locales. The danger factors for ST can be isolated into patient associated also, procedure associated factors.[19] Patient associated components include: discontinuation of antiplatelet therapy[15,20,21]; absence of response to antiplatelet therapy[22]; diabetes mellitus[23-25]; kidney disease[23,24] and acute coronary syndrome (ACS)[24], procedure related variables include coronary vessel dissection)[25]; lacking stent organization or sizing[20] and choice of stent, i.e. exposed metal stents or medication eluting stents.[10]

The treatment of STEMI is focused primarily on achieving prompt and sustained coronary reperfusion, minimizing myocyte necrosis and the prevention of subsequent reinfarction.[26] Once the acute causes of infarction have been addressed it is also important to consider secondary prevention of cardiac risk factors and lifestyle modification to reduce the impact of subsequent CHD.[27] When deciding how best to manage an acute STEMI there are three strategies which must be considered and evaluated, with particular thought given to the 6 individual patient characteristics, the context of symptom onset and the specific institutional capabilities and

logistics.[22] These three approaches are pharmacological thrombolytic (lytic) drug therapy, invasive percutaneous coronary intervention or the more conservative supportive medical management.[14]

In the context of myocardial infarction, ST-segment elevation on the electrocardiogram signifies damage to the cardiac myocytes with cellular polarization and the development of an 'injury current.[22] STEMI is a distinct clinical entity with an extensive scientific evidence base for indicated treatment, prognostication, and with numerous implications for the subsequent structure of care.[6] In spite of this, there is global evidence that the incidence and mortality from myocardial infarction has been decreasing over recent time; with the possibility that the increased ability to diagnose myocardial infarction has been confounding data that shows rates of acute myocardial infarction remaining steady.[8,11]

The aim of our study was to determine the frequency of stent thrombosis after primary PCI in patients with STEMT. Several studies have shown stent thrombosis after primary PCI in patients with STEMI.[16,22] However, the evidence is still lacking in a Pakistani population. Developing acute stent thrombosis in patients already suffering from STEMI will not only increase the morbidity but also their hospital stay and disease burden. This study will help the clinicians to identify the group of patients with high risk of stent thrombosis. In addition by my study emphasis may be given on early detection and its appropriate management plan to save the patients from irreversible cardiac damage and to reduce morbidity, disease burden and hospital stay in this already compromised group of patients. The clinical preliminaries will in general present ST rates for a specific kind of stent utilized in a selected case, though the registry information can assess the ST rates in a genuine involvement with a certain geological region. There is a requirement for contemporary registries to look at frequency also, hazard of ST consistently.

MATERIALS AND METHODS

This descriptive cross sectional study was conducted in NICVD Hospital Karachi from 30th June 2017 to 31st December 2017 and comprised 163 patients and age between 18-70 years of either gender with ST elevation Ml for <90 minutes, who undergone primary PCI included. While cases with no informed consent, renal impairment, prior history of cardiac surgery, prior PCI and heart failure excluded from the study. The sign with symptoms of STEMI for <90 minutes, after taking informed written consent patients were included in the study. All these patients undergone primary PCI by senior registrar or consultant cardiology and stent either drug-eluting stents (coated with medication) or bare-metal stent will be placed. These patients were observed for 24 hours for acute stent thrombosis. Patients who developed sudden onset of typical chest pain, indicating acute ischemia in the distribution of the target vessel (in which stent is placed), in these patient's angiography was done (relook) if it shows complete occlusion within the stented segment with evidence of thrombus, patient was labelled as having acute stent thrombosis. Post stratification Chi square test was applied P≤0.05 was considered as significant.

RESULTS

The mean age was 51.78±13.09 years, mean BMI was 27.56±6.28 kg/m^2, mean duration of ST elevation myocardial infarction was 62.46±8.48 minutes. One hundred and seventeen (71.7%) were males and 46 (28.23%) were females. Drug-eluting stents was placed in 87(53.37%) and bare metal was placed in 76(46.63%) patients. Sixty five (39.87%) were hypertensive while 98 (60.13%) were found to be normal. Fifty seven (34.97%) were diabetic while 106 (65.03%) were found to be normal. Fifty three (32.51%) were smokers while 110 (67.48%) were non-smoker. In distribution for type of stented vessel right coronary artery 42 (25.8%), left anterior descending artery 94 (57.7%) and left circumflex artery was 27 (16.5%). Positive acute stent thrombosis was noted in 2 (1.23%) [Table 1]. Stratification of age, gender, duration of ST, BMI, type of stent and stented vessel is shown in Table 2.

Table 1: Frequency of stented vessel (n=163)

Stented vessel	No.	%
Righty coronary artery	42	25.8
Left circumflex	27	16.5
Left anterior descending artery	94	57.7

Table 2: Stratification of age, gender, duration of ST, BMI, type of stent and stented vessel (n=163)

Variable	Acute Stent Thrombosis		P value
	Yes	No	
Age (years)			
18-55	1 (0.6%)	68 (41.7%)	0.669
>55	1 (0.6%)	93 (57.1%)	
Gender			
Male	1 (0.6%)	116 (71.2%)	0.486
Female	1 (0.6%)	45 (27.6%)	
Duration ST (minutes)			
20-60	-	50 (30.7%)	0.479
>60	2 (1.2%)	111 (68.1%)	
Body mass index (Kg/m^2)			
18.5-27	-	65 (39.9%)	0.360
>27	2 (1.2%)	96 (58.9%)	
Type of stent			
Drug-eluting	1 (0.6%)	86 (52.8%)	0.717
Bare metal	1 (0.6%)	75 (46%)	
Stented vessel			
Left anterior descending artery	1 (0.6%)	93 (57.1%)	0.664
Right coronary artery	1 (0.6%)	41 (25.2%)	
Left circumflex artery	-	27 (16.6%)	

DISCUSSION

Around the world, the occurrence and predominance of cardiovascular diseases change contingent on the different components including financial status, medical services frameworks, and so forth however we are missing exact information up until this point.

Ahmed[28] conducted observational study at PIMS Islamabad, among 43 cases of STEMI, with average age of 55.91±9.51 years, the mean TIMI score of the patients was 2.56±0.50, achieved high rate of essential PCI almost 100%.

Parodi[29] evaluated the prevalence, efficacy, and outcomes of primary PCI in patients with STEMI because of stent thrombosis in 2,464 consecutive cases managed by primary PCI in 3% cases of STEMI, Stent Thrombosis was

the contributing factor. PCI reported to be successful in 96% cases of ST group, the re stenosis was 54% in ST group versus 17% without ST group at six month angiographic follow up. They conclude that, the prevalence of primary PCI for ST is low. Additionally to restore vessel patency stenting with or without thrombectomy is effective in cases with ST, but restenosis is frequent. Surprisingly they consider ST managed with even successful PCI is related with huge infarct and poorer outcome.

Ergelen[30] retrospectively collected data from 2644 cases with STEMI went for primary PCI, they compared data in two groups of ST and de novo STEMI with 22 months follow up; observed ST as contributing factor in 4.4% cases, Patients with ST had significantly higher incidence of indoor mortality, reinfarction rates than patients with de novo STEMI, while reinfarction rate in hospital was same in both groups.

Singh[31] observed 1% cases of ST among 2303 cases managed by primary PCI, he further discussed that in-hospital 30-day mortality, cardiogenic shock and cerebrovascular accidents were more in the early ST group.

In retrospective data of 2071 cases by Khoury[32] observed left ventricular thrombus in 1.5%, 90% of whom had anterior STEMI. Batchelor[33] also observed ST in 0.55% of 41,137 consecutive PCI.

Pimor[34] in his study evaluated outcomes in patients in hospital with STEMI with multi-vessel disease improves with immediate CR or not; 9365 cases were analyzed, among those *n*=3412 patients with multi vessel disease managed with PCI were included, immediate complete revascularization was done in 2.9%, he further concludes that Quick CR didn't improve in-medical clinic results of patients with STEMI with multi vessel illness.

Moss[35] had worked on evidence based study by trans thoracic echo to detect left ventricular thrombus, among 2608 patients who underwent PCI for STEMI, 2.4% had evidence of LVT, these were prone to develop atrial fibrillation but LVT was not related with escalated danger of systemic thromboembolism. While in our study right coronary artery 42 (25.8%), left anterior descending artery 94 (57.7%) and left circumflex artery was 27 (16.5%) were in distribution for type of stented vessel.

Seif[36] advised the primary PCI on priority basis for patients with COVID-19 STEMI, he further suggested P2Y12 inhibitors such as prasugrel, GP IIb/IIIa inhibitors after PCI to prevent ST and to achieve fruitful outcomes after procedure.

Heestermans[37] evaluated 5842 cases of STEMI after PCI, 3.5% resulted in ST, among these 1.7% cases had acute and 1.8% subacute ST. In spite of the fact that death rates are high for the two groups, repetitive ST happens all the more oftentimes after a subacute. Positive acute stent thrombosis was noted in 1.23% in our study.

In prospective study by Farman et al[38] among 113 patients with STEMI for primary PCI who received Anti platelet therapy, with follow-up at one, 3 and 6 months with the objective to document expiry, myocardial infractions, CABG and re-hospitalization; among 113 cases, majority 90.3% were male and 9.7% were female, with average age of 51.2±11.7 years, indoor mortality was 5.3%, 4.9% needed CABG at 6 month and 7.9% patients expired in mean follow up time. The findings were comparable to ours i.e. majority of patients in our study were male (male to female ratio was 1.86:1). While in our study mean age was 51.78±13.09 years, mean BMI was 27.56±6.28 kg/m^2, and mean duration of ST elevation myocardial infarction was 62.46±8.48 minutes. 71.7% were male and 28.23% were female. Drug-eluting stents was placed in 53.37%and bare metal was placed in 46.63% patients. 39.87% were hypertensive, 34.97% were diabetic, 32.51%) were smokers.

CONCLUSION

The frequency of acute stent thrombosis after primary PCI was found to be lower i.e. 1.23%. There is a need to conduct randomized studies using large sample size over a longer period of time will be more representative, particularly in case of rarer disease with multiple study centers in Pakistan are needed to confirm the findings of present study. It will also nullify any regional bias due to fewer centers of treatment. Our research findings are useful for prioritizing future acute stent thrombosis research needs.

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