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Research Article

Pharmaco-Invasive Therapy for Acute ST-Elevation Myocardial Infarction. - A Viable Alternative to Primary Percutaneous Coronary Intervention

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Abstract

Primary percutaneous coronary intervention (pPCI) is considered as the preferred treatment for acute ST-Elevation myocardial infarction (STEMI). However, its availability is limited to less than 10% in rural and sub urban population in India (1). Therefore, Pharmaco-Invasive Therapy (PIT) (Thrombolysis first followed by planned coronary stenting) as an alternative to pPCI for acute STEMI has more recently been explored. A retrospective observational study of 60 patients with acute STEMI treated at the Dedicated Heart Attack Treatment Centre of SKY Hospital & Research Centre, Imphal, India over a period of 2 years has shown that Pharmaco-Invasive Therapy improved survival of patients with acute STEMI to 100% and increased Left Ventricular Ejection Fraction (LVEF) by 5.08% at the time of discharge and may be used as a viable alternative to pPCI in the treatment of patients with acute STEMI when pPCI cannot be performed within recommended time.

Keywords: thrombolysis; pharmaco-invasive therapy.

Introduction

Cardiovascular disease is World's first fatal disease. It contributes to 30% of global mortality and 10% of the global disease burden [2, 3]. Myocardial Infarction (MI) is one of the five main manifestation of coronary artery disease (CAD) [4]. In epidemiological studies, the incidence of myocardial infarction in a population can be used as a proxy for estimating the CAD burden [4].

Acute ST-Elevation myocardial infarction results from sudden total or subtotal occlusion of one or more coronary artery [5]. Early revascularisation of the occluded coronary artery is the principle of treatment for such patients presenting within 12 hours of onset of symptoms, preferably within 30 minutes of arrival to hospital. Primary percutaneous coronary intervention is the recommended treatment strategy for acute STEMI, if the same can be performed within 120 minutes from the first medical contact (FMC) [6]. However, there are several hardles to be overcome to achieve this target in many areas of the World. Availability of PCI facility with skilled manpower is limited to few centres of big cities [5]. Furthermore, to do timely pPCI for acute STEMI in many such centres may not always be practically possible 24 hours a day. The aim of this paper is to study if Pharmaco-Invasive Therapy is as effective as pPCI for acute STEMI

Material and Method

The present study was conducted at SKY Hospital & Research Centre, Imphal, India. Data of eighty patients with acute STEMI admitted over 2 years ending February 2020 were collected. Out of this, 60 patients who received Pharmaco-Invasive Therapy were included in the study. Patients with acute STEMI who presented with acute stroke, multi-organ failure or who died within one hour of presentation to the hospital were excluded from the study. In the study, the remaining 60 patients whose coronary angiogram showing > 70% residual diameter stenosis of the culpil lesion after Thrombolytic Therapy were included. The time interval in minutes between the arrival at the hospital to the start of thrombolysis was obtained. The time interval in hours from the time of thrombolysis to the time of coronary stent implantation of each case has also been obtained.

Complete history and clinical examination of all the 60 patients were carried out, including 12 lead ECG, troponin-T test, routine laboratory investigations, chest x-ray (CXR) etc. Bedside echocardiogram was provided to all the patients with acute MI on admission and at discharge. The diagnosis of STEMI was made using World Health Organization (WHO) definition and diagnostic criteria of MI [4].

All patients were seen in the Dedicated Heart Attack Treatment Centre (HAC) which was established at SKY Hospital & Research Centre in July,

2016 providing 24 hours emergency service specifically for patients with suspected M.I. Our HAC Team consists of Consultant Cardiologist/middle grade Cardiologist on site, other Emergency Medical Officers, well trained nurses and technicians. In the HAC, ECG was given to all the patients within 5 minutes of presentation to the Emergency Room (ER). Loading dose of dual anti-platelet (DAP) therapy was given within 15 minutes to all the patients who were diagnosed with STEMI. After ruling out any contraindication (such as increased risk of bleeding), thrombolysis was given using fibrin specific fibrinolytic agents. Injection reteplase [dosage: 10 units intravenous (IV) over 2 minutes (1st dose), followed by 10 units IV over 2 minutes (2nd dose) after 30 minutes], or Injection tenecteplase (dosage 30 mg IV for patients weighing less than 60 kg, 35 mg IV for patients weighing 60 kg - 69 kg, 40 mg IV for patients weighing 70 kg - 79 kg, 45 mg IV for patients weighing 80 kg - 89 kg, 50 mg IV for patients weighing ≥ 90 kg) [7]. All thrombolysed patients also received Inj. enoxaparin as per protocol.

Result

All patients received thrombolysis within 12 hours of admission, majority 40 (76%) within 30 minutes (**Table-1**) and coronary stenting within 10 days. All patients with STEMI received Echocardiogram to estimate Left Ventricular Ejection Fraction (LVEF) on admission and at discharge (**Figure-1**).

Time parameter (minutes)	Mean	Median	Std. Deviation
Door-to-ECG	5 minutes	5 minutes	0
Door to dual anti-platelet (DAP)	14 minutes	10 minutes	14
Door-to-thrombolysis	25 minutes	20 minutes	26

Table 1: Showing various Time parameter in minute (Door to ECG, Door to DAP & Door to thrombolysis).

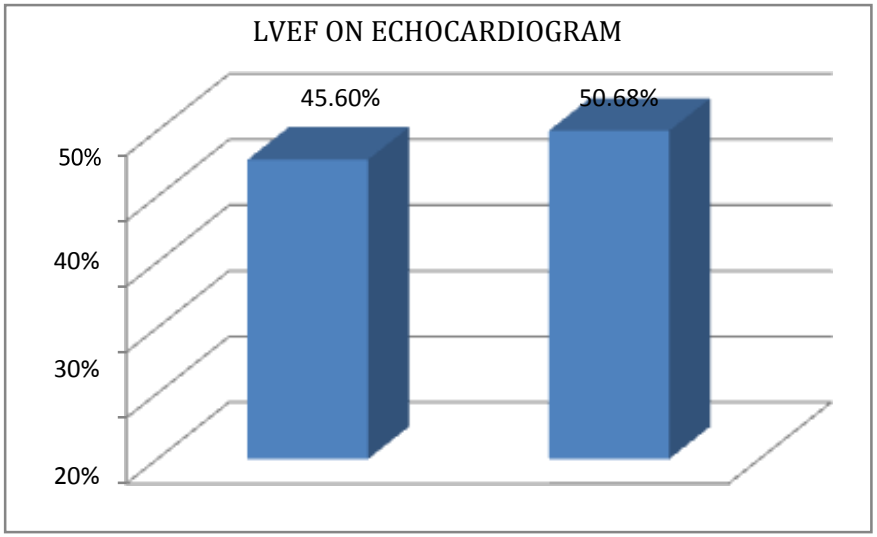

Figure 1: showing improved LVEF from 45.60% (before) to 50.68% after Pharmaco-Invasive Therapy.

LVEF	Mean	SD	Mean difference	Paired t test
ON ADMISSION	45.60%	8.72	5.08%	t= 3.37; p= 0.01
AT DISCHARGE	50.68%	7.03		

Table 2: The increase of the mean LVEF from 45.60% on admission to 50.68% at discharge was statistically significant (t-value = 3.37 and p-value = 0.01).

Following our discharge protocol which included, among others, mobilization for at least 100 steps on level without angina and dyspnea, all patients who received the PIT were discharged home with a 12 days median length of hospital stay.

With respect to survival rate, all the sixty patients who received Pharmaco-Invasive Therapy during the study period survived at the time of discharge.

Discussion

Revascularization of an occluded coronary artery as early as possible is the principle of treatment for patients with acute STEMI [5]. Timely performed primary PCI is considered as the preferred treatment strategy for acute STEMI. When this treatment cannot be provided within the recommended time, Pharmaco-Invasive Therapy has been tried with comparable outcome [8]. The STREAM trial [8] clearly showed that PIT and pPCI were comparable in the rate of primary composite end points (death, reinfarction, cardiogenic shock, heart failure at 30 days) in the treatment of acute STEMI if pPCI could not be performed within 60 minutes of presentation to Emergency Department. The STEPP-AMI study [9] also demonstrated that Pharmaco-Invasive Therapy is not inferior to primary PCI in the treatment of acute STEMI with similar outcome at 2 years of follow up. However, it remains unclear whether late presenters will benefit from the STREAM like PIT. In our study it is possible that establishment of Dedicated Heart Attack Treatment Centre at SKY Hospital helped provide a quick diagnosis, loading dose of DAP, 3rd generation Thrombolytic agent and Enoxaparin which might have helped restore at least partial coronary blood flow distal to the

culprit lesion which subsequently got balloon-dilated and stented. It was also observed that there was no case of failed thrombolysis in our study-population in comparison to 12.1% in STEPP-AMI study.

Conclusion

Pharmaco-Invasive Therapy for acute STEMI in a well fashioned Dedicated Heart Attack Centre has shown improved survival along with increased left ventricular ejection fraction. This treatment strategy may be considered as a viable alternative to primary PCI for emergency treatment of acute STEMI in many developing countries where timely primary PCI cannot be performed. Large clinical trials may help further substantiate the finding of the present study.

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