EDITORIAL

ST- Elevation Myocardial Infarction; Time is Muscle

Successful reperfusion following ST- segment elevation myocardial infarction (STEMI) can be achieved using either pharmacologic or mechanical interventions. The goal of reperfusion therapy is to achieve early, full, and sustained coronary blood flow in the infarct related artery (IRA). Both primary percutaneous coronary intervention (PCI) and fibrinolytic therapy fulfill some but not all of these goals. Fibrinolytic therapy permits rapid initiation of therapy, but normal Thrombolysis In Myocardial Infraction (TIMI) grade 3 flow is restored in only 50%-60% of arteries; moreover, early reocclusion occurs in some 10% of patients after initially successful fibrinolytic. Conversely, primary PCI achieves better rates of TIMI grade 3 flow than fibrinolytic therapy, but there are often delays to reperfusion. Fibrinolytic therapy offers ease and consistent performance of administration, while PCI is more complex and can be logistically challenging. On the other hand, primary PCI is associated with more favorable outcomes compared to thrombolyis when performed rapidly. Without a doubt, PCI is superior to fibrinolysis under ideal circumstances. However, only a minority of acute myocardial infarction (MI) patients in such "ideal circumstances."

About 35 year ago, Eugene Braunwald, postulated a revolutionary hypothesis: *Time is muscle.* He proposed that acute MI is a dynamic process and that its clinical outcome is determined largely by infarct size. When he and his colleagues tested this hypothesis, they concluded: " Of greatest interest, from the clinical point of view, is the finding that the severity and extent of myocardial ischemic injury resulting from coronary occlusion could be redically altered not only by pretreatment but also by an appropriate intervention as late as 3 hours after the coronary occlusion. Subsequently two concepts emerged from clinical trail: 1) restoration of coronary patency improves survival; and 2) recanalization must be induced within a temporal window even narrower than Braunwald Postulation to get

maximum benefit. The current recommend time-to-treatment system goals acknowledge a critical total ischemic time of 120 minutes and an ideal "golden hour" of 60 minutes. At what point does the time factor affect clinical decision-making? The survival benefit associated with primary PCI for STEMI may be attenuated if door-to-balloon (D2B) time is delayed by>1 hour beyond door-to-needle time for fibrinolytic therapy. Given the importance of D2B and door-to-needle time, how well are medical facilities meeting guideline-based recommendations? According to the most recent data, thrombolytic therapy is delivered within 30 minutes of hospital arrival only to 38% of patients presenting with acute MI. Unfortunately,

D2B times in routine clinical practice are often much longer and transfer for primary PCI further delays reperfusion. Indeed, total D2B times for transfer for primary PCI further delays reperfusion. Indeed, total D2B times for transfer patients undergoing primary PC[in the United States rarely achieve ACC/AHA recommended benchmarks (<5% of transfer patients). Situation in our country is even grimmer. According to Elliott M. Antman, When a substantial delay in initiating primary PCI is likely, reperfusion therapy with second or third-generation fibrinolytic agents should be strongly considered.

Adjuvant antithrombin and antiplatelet therapies play a critical role in the pharmacologic reperfusion of patients presenting with STEMI. Unfractionated heparin (UFH) has been the traditional antithrombin used, but it has several well- documented pharmacologic and practical limitations. Braunwald, antman, and others have shown in the EXTRACT-TIME 25 (Enoxaparin and Thrombolysis Reperfusion for acute Myocardial Infarction Treatment-Thrombolysis in Myocardial Infarction 25) trial that a strategy of the low molecular weight heparin (LMWH) enoxaparin was superior to adjunctive therapy using UFH for preventing death or recurrent ischemic events in more than 20,000 patients receiving fibrinolytic therapy for STEMI.

Antman, Braunwald, and colleagues recently conducted a meta-analysis of a decade-worth of clinical trial data to determine the effect of age on outcomes following fibrinolysis for STEMI. Compared with younger patients (n=123,568), elderly patients (n= 24,531) had a three to four- fold increases risk of mortality and adverse event when treated with fibrinolysis and antithrombin therapy. In our country though all the facilities are available but only or two centers are doing primary PCI in Dhaka. Initiatives should be taken to start it in all centers equipped for PCI. Only then symptom free and better quality of life can be assured to the patients having AMI.

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Reference:

1. Antman EM, Anbe DT, Armstrong PW, et al. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction- executive summary. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to revise the 1999 guidelines for the management of patients with acute myocardial infarction). J Am Coll Cardiol 2004; 44:671-719.