Pain to Reperfusion Time: Importance and Clinical Application

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Occlusion of coronary artery contributes to irreversible myocardial injury with a time-dependent pattern. Based on the time-dependent myocardial damage, early reperfusion therapy is a main stem for the treatment of acute myocardial infarction (AMI). Previous preclinical and clinical studies have demonstrated that time to successful reperfusion has play a major role to reduce the risk of cardiac events. The benefit of early reperfusion therapy, especially in patients with ST-segment elevation myocardial infarction (STEMI) is limited to the first 12 hour after the symptom onset. The GISSI (Gruppo Italiano per lo Studio della Streptochinasi nell' Infarto Miocardico) trial reported that AMI patients who received streptokinase within the first hour after the symptom onset showed a 51% reduction in mortality compared to control treatment. Similarly, the rapid performance of primary percutaneous coronary intervention (PPCI) also reduced mortality in several studies. Therefore, current guideline recommends a door-to-balloon time of 90 minutes or less and a door-to drug time of 30 minutes or less as a target goal. However, recent national registry data in United States from 2005 to 2009 showed that the improvement of door-to-balloon time undergoing PPCI for STEMI may not provide further benefit for in-hospital mortality, suggesting additional strategies should be required to reduce mortality in patients with AMI. In the view of total ischemic time, the time of symptom onset to treatment and transfer time between PCI-incapable and PCI-capable hospitals are another important factors. Pre-hospital time delay, is defined as a time interval between the symptom onset to admission coronary care unit, has been reported to be associated with unfavorable clinical outcomes after STEMI presentation. The data from KAMIR demonstrated the presence of a significant pre-hospital time delay (188.0 ± 133.6 minutes, median, 152 minutes) in Korea and this time delay increases the risk of in-hospital as well as 1-year mortality in 3,399 patients with STEMI. Furthermore, patients who have lower level of education, symptom onset during night time, using private transportation vehicle and triage via other hospitals were independent predictors for pre-hospital time delay. Early diagnosis of AMI including prompt ECG recording by first medical contact, especially at home or in ambulance, and coordinated system between first medical contact and hospital may contribute a pivotal role to reduce pre-hospital time delay. In fact, the MonAMI (ambulance Victoria and MonashHEART Acute Myocardial Infarction) protocol from Austria demonstrated the improvement of door-to-balloon time, time at scene and transport time. Therefore, more effort should be focused on shorten pre-hospital time delay through social education for high-risk patients and systemic social network for patients with STEMI.