Efficacy of early intravenous landiolol, an ultrashort-acting beta-blocker on infarct size and its safety in patients with myocardial infarction undergoing primary PCI: a randomized, controlled study

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Background: Previous clinical studies showed that early intravenous metoprolol before reperfusion in patients with ST-elevation myocardial infarction (STEMI) undergoing primary PCI reduced infarct size. However, intravenous beta-blockers in acute phase of STEMI can be associated with adverse effects such as cardiogenic shock and atrioventricular block. Landiolol is an ultrashort-acting beta-blocker with a half-life of 3 min that is eight times more cardioselective than esmolol.

Purpose: We evaluate the efficacy of intravenous infusion of landiolol on infarct size and its safety in STEMI patients undergoing primary PCI.

Methods: This study is a multicenter randomized control trial. A total of 47 patients with Killip class II or less STEMI undergoing PCI within 12 hours of symptoms onset were randomized to receive intravenous landiolol (n=23) or not (control, n=24). Patients allocated to landiolol group delivered an intravenous continuous dose of 3μg/min/kg before reperfusion and then continued until a total dose of 50mg. All patients started oral metoprolol or carvedilol within 12 hours. The primary end point was myocardial salvage index (MSI) on magnetic resonance imaging performed 5 to 7 days after PCI. MSI was defined as the difference between the area at risk and the area of necrosis analyzed using a commercial software.

Results: Magnetic resonance imaging was performed in 35 patients (17 patients in landiolol group and 18 patients in the control group), and ischemia duration time was 229 minutes in the landiolol group and the 242 minutes in control. In adjusting for confounding variables, the areas of myocardium at risk were not difference in both groups (54.4g in the landiolol group, and 46.8g in the control group; p=0.31). However, MSI in the landiolol group was significantly reduced than that in the control group (36.8% and 57.0%; p$<$0.001).

In both group blood pressure was not difference in recruitment (142mmHg in landiolol group, and 144 in control) and starting PCI (163mmHg in landiolol group, and 165 in control). Regarding safety, the composite of death, malignant ventricular arrhythmia, cardiogenic shock, and atrioventricular block at 24 hours did not differ between the landiolol and the control groups (8.7% and 8.3%, respectively, p=0.93).

Conclusion: Early intravenous landiolol before starting primary PCI reduced infarct size in STEMI patients without significant hemodynamic adverse effects.