Comparison of instant thrombolysis plus early PCI and primary PCI in STEMI patients, view of CMR early after reperfusion therapy

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PURPOSE: Primary Percutaneous coronary intervention PCI (PPCI) is the preferring reperfusion modality for ST-segment elevation myocardial infarction (STEMI) patient in the initial 12 hours after onset of symptom. When PPCI will be remarkably detained, instant thrombolysis is recommended as an alternative therapy. Early PCI after successful thrombolysis may improve the outcome comparing to thrombolysis alone. However, efficacy of this strategy in the view of cardiovascular magnetic resonance (CMR) is not clear. This study aims to compare CMR results early after reperfusion between PPCI and instant thrombolysis plus early PCI modalities.

Methods: Current data came from an ongoing randomized clinical trial comparing instant thrombolysis plus early PCI and PPCI strategies in STMEI patients. CMR scan were performed on a 3.0-T Philips Achieva scanner 2 to 8 days after reperfusion if patient has no contraindications. In thrombolysis group, coronary angiography and PCI were carried 6 hours after thrombolytic therapy except for thrombolysis failure, in which situation rescue PCI would be done immediately. Left ventricular functional assay was based on multi-slice short axis view of cine imaging. Myocardial edema and hemorrhage were detected by T2 weighted imaging. Necrosis size and microvascular obstruction (MVO) were determined by late gadolinium-enhanced imaging.

Results: Baseline characteristics including symptom-to-reperfusion time were similar between groups. However, door-to-reperfusion time was significantly shorter in thrombolysis group (45±23 minutes vs 88±44 minutes, P<0.001). Twenty patients in thrombolysis group (n=22) received subsequent stent implantation. One patient took only balloon angioplasty and 1 patient didn't take further PCI therapy.   All patients in PPCI group (n=20) received stent. Final Thrombolysis In Myocardial Infarction (TIMI) flow grade 3 after PCI were achieved in 82% of patients in thrombolysis group and 88% in PPCI group (P=0.32). Time from symptom onset to CMR scan was similar (3.4±1.7 and 3.6±1.4 days in thrombolysis and PPCI group, respectively, P=0.78). CMR results were statistically equal between thrombolysis and PPCI group: Left ventricular ejection fraction (LVEF) were 49.09±10.63% and 50.12±10.97% (P=0.77); Necrosis percentage of Left ventricle were 21.82±13.32% and 27.0±15.47% (P=0.263); Rate of intramyocardial hemorrhage was 36.4% and 29.4% (P=0.65). Rate of MVO was 68.2% and 58.8% (P=0.55). Of 6 patients with failing thrombolysis (TIMI flow grades 0 or 1 in infarction-related artery in angiography), LVEF, necrosis percentage and rate of hemorrhage or MVO were all numerically worse than those with successful thrombosis (TIMI flow grade ≥2 in initial angiography)(LVEF, 45.16±10.76% v.s 50.56±10.54%, P=0.3; necrosis percentage, 29.33±11.71% v.s 19.01±13.10%,P=0.11; hemorrhage 83.3% v.s 18.8,P=0.021; MVO 83.3% v.s 62.5 P=0.67) .

Discussion: PPCI has been proven a superior reperfusion modality than single thrombolysis in STMEI patients. The presented data demonstrated that from the view of CMR, efficacy of instant thrombolysis plus early PCI may be non-inferior than PPCI therapy. Both the indicators reflecting myocardial microvascular function (MVO and hemorrhage) and indicators reflecting globe heart damage (LVEF and necrosis percentage) were similar between groups. However, despite the final good TIMI flow grade (grade 3) after rescue PCI, apparent trend of worse CMR results were observed in patients with thrombolysis failure than those with successful thrombolysis.

Conclusion: According to the current CMR data, strategy of instant thrombolysis plus early PCI may have comparable efficacy as PPCI in STEMI patients. However, thrombolysis failure may be related to worse outcomes even with a later successful rescue PCI.