Long Term Follow up of Patients with no Reflow Phenomenon in Comparison with Normal Reflow following Primary Percutaneous Coronary Interventions

Thesis

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List of Abbreviation

ACC	: American college of cardiology.
ACE	: Angiotensin converting enzyme.
ACEI	: angiotensin converting enzyme inhibitor.
ACS	: Acute coronary syndrome.
ADA	: American diabetes association.
ADP	: Adenosine diphosphate.
AHA	: American heart association.
AMI	: Acute myocardial infarction.
ARB	: Angiotensin receptor blocker.
ATP	: Adenosine triphosphate.
ATTEMPT	: A clinical outcome after thrombectomy or standard angioplasty in patients with ST elevation myocardial infarction study.
CADILLAC	: Controlled Abciximab and Device Investigation to Lower Late Angioplasty Complications.
CABG	: Coronary arteries bypass grafting.
CFR	: Coronary flow reserve.
CK	: Creatine kinase.
CK-MB	: creatine phosphokinase MB fraction
CMR	: Cardiac magnetic resonance imaging.
CRP	: C-reactive protein.
CTFC	: Corrected TIMI frame counts.
DM	: Diabetes mellitus.
EF	: Ejection fraction.
ENLEAT	: No-reflow protection and long-term efficacy for acute myocardial infarction with Tongxinluo a randomized double-blind placebo-controlled multicenter clinical trial.
ESC	: European society of cardiology.
GP	: Glycoprotein.
HR	: Hazard ratio.
IABP	: Intra-aortic balloon counter pulsation.
IC	: Intracoronary.
ICD	: Implantable cardioverter defibrillators.
LMW	: Low molecular weight.
LMWH	: Low molecular weight heparin.

LV	: Left ventricle.
MACE	: Major cardiac adverse events.
MADIT-II	: Multicenter automatic defibrillator implantation trial II.
MCE	: Myocardial contrast echocardiography.
mcg	: microgram.
MI	: Myocardial infarction.
MVO	: Microvascular obstruction.
MPTP	: The mitochondrial permeability transition pore.
µg	: Microgram.
NTG	: Nitroglycerine.
NSTEMI	: non ST elevation myocardial infarction.
OR	: Odds ration.
PCI	: Percutaneous coronary intervention.
PKC	: Protein kinase C.
PMN	: Polymorph nuclear leucocytes.
PTCA	: Percutaneous transluminal coronary angioplasty.
RECOVER	: REstoration of COronary flow in patients with no-reflow after primary coronary interVEntion of acute myocaRdial infarction.
ROS	: Reactive oxygen species.
RR	: Relative risk.
RI	: Renal impairment.
SE	: Standard error of mean.
SD	: Standard deviation.
SNP	: Na nitroprusside.
SPECT	: Single photon emission computed tomography.
STEMI	: ST elevation myocardial infarction.
TAPAS	: Thrombus Aspiration during PCI in AMI Study.
TDE	: Transthorathic Doppler echocardiography.
TIMI	: Thrombolysis in myocardial infarction.
tPA	: tissue Plasminogen Activator.
UA	: Unstable angina.
UFH	: Unfractionated heparin.
VAPOR trial	: Pretreatment with intragraft verapamil prior to percutaneous coronary intervention of saphenous vein graft lesions; results of the randomized, controlled vasodilator prevention on no-reflow.
VS	: Versus
WMSI	: wall motion score index.

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Introduction

After an AMI, early and successful myocardial reperfusion with the use of PCI is the most effective strategy for reducing the size of a myocardial infarct and improving the clinical outcome. In recent years, optimal outcome of reperfusion treatment includes not only sustained coronary arterial patency, but also reperfusion of myocardium supplied by the affected coronary artery ***(Svilaas et al., 2006).***

The phenomenon of no-reflow is defined as inadequate myocardial perfusion through a given segment of the coronary circulation without angiographic evidence of mechanical vessel obstruction ***(Kloner et al., 1974).***

The mechanism of angiographic no-reflow can be more easily conceptualized as there is a direct relationship between the application of a percutaneous device andthe subsequent reduced flow. Distal embolization of plaque and/or thrombus from the lesion site is likely mechanisms ***(Abbo et al., 1995).***

Loss of capillary auto regulation withthe local release of vasoconstrictor substances has also been postulated as an additional mechanism, this would explain the favorable response seen with intracoronary administration of calcium antagonists ***(Paik et al., 1994).***

The no-reflow phenomenon in the myocardium was originally described in 1974 by Kloner et al ***(Kloner et al., 1974).***

The capillary structure becomes disorganized in the no-reflow zone because of endothelial swelling, compression by tissue, myocyte edema, and neutrophil infiltration ***(Kloner et al., 1980).***

This pathologic process can be accelerated by coronary reperfusion, leading to progressive decline of coronary flow ***(Komamura et al., 1994).***

Tissue edema, endothelial disruption, plugging of capillaries by neutrophils and microthrombi, inflammation due to the generation of oxygen-free radicals and activation of complement components, and contracture of neighboring myocytes are all promoted by coronary reperfusion ***(Manciet et al., 1994).***

Thus, the no-reflow phenomenon results partly from reperfusion injury. As well as correlating with infarct size, no reflow can provide prognostic information ***(Ito et al., 1996).***

The ischemic no-reflow phenomenon occurs after the myocytes in the area are already dead and, therefore, later recovery of function is almost impossible. A large no-reflow zone is associated with reduced left ventricular contractile function. In addition to predicting recovery of systolic function, the presence of no reflow predicts acute complications after AMI. Patients with the no-reflow phenomenon form the highest-risk subgroup of patients undergoing reperfusion, with raised associated risks of early and sustained congestive heart failure and death ***(Ito et al., 1992).***