

Myocardial stunning

How dose myocardial infarction develop?

The myocardium is nourished from blood flowing in coronary arteries. When a coronary artery is abruptly occluded by a thrombus which develop at the site of a ruptured plaque or endothelial erosion, myocardial necrosis begins at the center in the sub-endocardial region, and a wave front of necrosis propagates towards the peripheral adjacent area. Thus, at the center, the myocardium is necrotic, while in the adjacent regions, the muscle is still viable and jeopardized, meaning that if blood flow is not resumed early it may become necrotic, Therefore, because time is muscle, reopening of the occluded vessel should be performed fast in order to salvage the viable tissue at risk of necrosis.

Sequence of manifestations after coronary artery occlusion and myocardial stunning.

After occlusion of a coronary artery, the first phenomenon that develops is reduction or cessation of coronary blood flow followed by biochemical and metabolic abnormalities, diastolic dysfunction, myocardial systolic dysfunction, electrical changes and symptoms appearing according to the sequence of the ischemic cascade. As already mentioned, in order to save the muscle at risk, resumption of coronary flow should be achieved promptly. After successful early resumption of coronary artery flow, the manifestations of myocardial ischemia, as logically reasoned, will resolve in a sequence or cascade of resolution "with a reversed order of the ischemic cascade" "last in first out". Thus, coronary flow becomes normal while contraction is still subnormal and reduced. It takes time till the contraction of the myocardium recovers after the coronary flow is normalized. This phase and phenomenon of normal coronary flow and still reduced myocardial contraction is called myocardial stunning.

Other causes and expressions of myocardial stunning.

In addition, although myocardial stunning initially was used for systolic dysfunction, myocardial stunning also is expressed as myocardial diastolic dysfunction too. The term myocardial stunning may be extended beyond transient coronary occlusion to included situations like increased production of catecholamines and endotheline, and myocardial inflammation. Moreover, with rapid heart rate, imbalance of oxygen supply demand may lead to ischemia resulting in tachycardia induced cardiomyopathy and after resumption of normal heart rhythm, there may be myocardial stunning and it may take time till recovery of myocardial contraction. Myocardial stunning may involve not only ventricular myocardium but also atrial myocardium may be affected. Another phenomenon that may be related to myocardial stunning is myocardial hibernation where regional chronic myocardial dysfunction develops in a territory supplied by a severely narrowed coronary artery. Myocardial hibernation may actually result from repeated episodes of reversible ischemia,

caused by a loss of coronary flow reserve, that lead to a state of persistent post-ischemic dysfunction, i.e. stunning.

Flow/contraction mismatch.

After resumption of coronary artery flow, there is flow contraction mismatch with high coronary flow and reduced myocardial contraction. Evaluation of this mismatch and the ratio of flow to contraction may provide opportunity to intervene in order to accelerate and improve myocardial functional recovery.

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Publication

[Editorial commentary: Interpreting and dealing with myocardial stunning](#)

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Trends Cardiovasc Med. 2018 May