

Opinion

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Reperfusion Therapy of Myocardial Infarction: From Classic to Modern Fibrinolysis



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Opinion

One of the main changes occurred in medicine in the last 25 years has been reperfusion treatment in acute myocardial infarction. From management of complications to immediate intervention in STEMI has come a long way.

Four decades ago, STEMI treatment pointed to complications management, mainly arrhythmic (Ventricular fibrillation or AV block) or mechanics (cardiogenic shock, VSD, cardiac rupture or expansion). Intervention era started with intracoronary fibrinolysis, which quickly evolved to endovenous approach.

Fibrinolytic treatment was a landmark as the beginning of the “reperfusion era” in STEMI. But it also was the beginning of bleeding complications in acute coronary syndromes, and its most dreaded form, intracranial hemorrhage.

Streptokinase, the historically (and currently) most used fibrinolytic drug is far from ideal: in addition to a low reperfusion rate (TIMI 3 flow around 60%), it must be used by intravenous infusion and it has other problems as immunogenicity (which conditions allergies and antibodies) or hypotension, a big issue in patients with severe heart failure or cardiogenic shock. Besides, the success of fibrinolysis (as occurs in stroke) is very time-dependent, being clearly more effective within 1st hour of myocardial infarction. Culprit artery re-occlusion is an additional problem. New (and more expensive) fibrin specific drugs, such as tPA (alteplase), rPA (reteplase) and TNK-tPA (tenecteplase), tried to overcome these problems. In fact TNK, the most modern of them, has several advantages: is fibrin-specific, used by intravenous bolus and it does not induce hypotension or immunogenicity.

At the same time, percutaneous coronary intervention (PCI) was started on its way in STEMI. It was first used after failed fibrinolysis, and then it evolved quickly to primary intervention. Today direct PCI with stent is the 1st line treatment for STEMI and is recommended by all guidelines [1,2]. Even if the patient

should be transferred (within 2 hours), PCI is recommended over fibrinolytic therapy.

However, not all medical centers count on equipment and qualified/experienced staff (as also recommended by guidelines) “on call” with fast response. So as fibrinolytics continue to be used, then the idea of combining fibrinolytics with PCI appeared as alternative approach. There are several options of PCI plus fibrinolytics as shown in Table 1.

Table 1: Types of PCI plus fibrinolytics in STEMI.

Type	Scenario	Effect
Rescue	Post failed reperfusion	+
Facilitated	Immediately Pre PCI	-
Pharmacoinvasive	PCI 3-24 hours post	++
Deferred	More than 24 hours	±

Facilitated PCI uses fibrinolytics as “pre-treatment” to improve the results of immediate angioplasty. These results were disappointing because this approach not only did not improve but it also worsened the results of PCI.

Table 2: In addition to classic fibrinolysis there is a modern fibrinolysis, with some differences but the most important: fibrinolysis is not more a definitive treatment; it is the first step to PCI.

Fibrinolysis	Classic	Modern
Prescription	Streptokinase infusion	TNK bolus
Site	Hospital	Ambulance/hospital
Coronary angiography	Selective	Routine
Objective	Curative	Palliative

Pharmacoinvasive approach instead, attempts to improve the results of fibrinolysis. The ideal protocol should be pre-hospital fibrinolysis with TNK, loading doses of clopidogrel and enoxaparin followed by immediate transfer for coronary angiography between 3 and 24 hours, for matching the results of

STREAM trial [3]. This may be an effective alternative treatment when PCI is not available in the recommended time, for rural and faraway locations [4]. The time window extends from 2 to 24 hours and allows a less urgent transfer. But it seems important to stress, that this “modern approach” contrast with the “old fashioned” fibrinolysis, and this is the aim of my comment. As shown in Table 2, in addition to classic fibrinolysis there is a modern fibrinolysis, with some differences but the most important: fibrinolysis is not more a definitive treatment; it is the first step to PCI.

Finally, as well as angioplasty, fibrinolysis has evolved too, from a competitive to a complementary treatment in the reperfusion therapy of acute myocardial infarction.

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