

КАК УЛУЧШИТЬ РЕЗУЛЬТАТЫ РЕПЕРФУЗИИ МИОКАРДА?

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У пациентов с инфарктом миокарда с подъемом сегмента ST экстренные эндоваскулярные вмешательства позволяют снизить смертность и риск повторного инфаркта. Выживаемость пациентов находится в прямой зависимости от скорости восстановления перфузии миокарда. При этом достижение кровотока TIMI 3 в эпикардиальных артериях не всегда означает нормализацию перфузии. Кроме проходимости крупных артерий очень важно оценивать и другие признаки восстановления перфузии: динамику сегмента ST и дистального кровотока. Уменьшить площадь инфаркта и снизить риск развития синдрома «no-reflow» может интракоронарное введение аденозина до восстановления кровотока в артерии. Прямая имплантация стента без преддилатации также может снизить риск осложнений. Использование катетера Amicath (IHT-Cordynamic, Испания) у пациентов инфарктом миокарда с подъемом сегмента ST позволяет эффективно восстанавливать перфузию миокарда в различных клинических ситуациях, избегать смещения тромба и дистальной эмболизации, предотвращать развитие синдрома «no-reflow».

Ключевые слова: инфаркт миокарда с подъемом сегмента ST, эндоваскулярные вмешательства при инфаркте миокарда, реперфузия миокарда.

HOW TO IMPROVE MYOCARDIAL REPERFUSION?

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Primary angioplasty in patients with ST elevation myocardial infarction reduces mortality and reinfarction rate. Immediate restoration of myocardial perfusion has a direct impact on one-year mortality. Achieving TIMI 3 flow in epicardial arteries does not mean that the myocardial perfusion has normalized. In addition to that, it is vital to evaluate alternative markers such as rapid resolution of the ST-segment elevation and restoration of optimal distal flow, blush grade 2–3. The intracoronary infusion of adenosine, administered prior to the opening of the artery, limiting the size of the infarction and decreases the incidence of no-reflow phenomenon. Direct stent implantation without pre dilation significantly minimizes the incidence of adverse effects. The Amicath catheter (IHT-Cordynamic, Spain) that we use in patients with ST elevation myocardial infarction allow us to obtain an effective myocardial reperfusion, in different clinical situations avoiding the displacement of the thrombus, or a distal embolism, and preventing the no-reflow phenomenon.

Key-words: ST elevation myocardial infarction, primary angioplasty, myocardial reperfusion.

Multiple randomized clinical trials have shown that in patients with ST elevation myocardial infarction myocardial revascularization by primary angioplasty at the onset of symptoms reduces mortality and reinfarction rates in comparison to treatment with fibrinolytics. The primary objective in these patients is to achieve a rapid and prolonged recovery of coronary flow with an adequate epicardial flow and myocardial reperfusion. It is vital that myocardial perfusion be rapidly restored, since every minute that passes causes an increase in one-year mortality.

Usually we can achieve epicardial TIMI 3 flow in 80–90% of patients who underwent primary angioplasty. However, achieving TIMI 3 flow in epicardial arteries does not mean that the myocardial perfusion has normalized. In fact only 50% of patients with a TIMI 3 flow will have a normal myocardial perfusion based on by magnetic resonance imaging (MRI), positron emission tomography (PET) or contrast Echo [1].

That is why we state that it is not enough to just get an adequate coronary TIMI 3 flow. In addition to that, during and after primary PCI we have to evaluate alternative markers such as rapid resolution of the ST-segment elevation and restoration of optimal distal flow (myocardial microcirculation), blush grade 2–3, since they have a direct impact on one-year mortality in these patients [2]. (Figure 1; Figure 2)

The scenario in which we generally treat these patients is an acute occlusion of the vessel with TIMI 0–1 and with a varied burden of fresh thrombus occluding the artery. For this reason, when treating these patients we have to keep in mind that we need to obtain an effective myocardial reperfusion, avoiding the displacement of the thrombus, or a distal embolism, and preventing the no-reflow phenomenon. Distal embolism is a major cause of inadequate endocardial perfusion, due to the occlusion of microcirculation by fragments of the thrombus; therefore the intervention on these patients

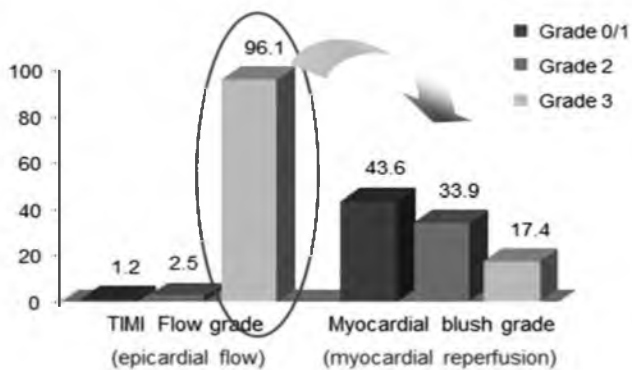


Fig. 1. Beyond TIMI 3 flow myocardial blush in CADILLAC trial.

Перфузия миокарда у пациентов с кровотоком TIMI 3 в эпикардальных артериях (исследование CADILLAC).

must be performed with care trying to minimize the use of devices that might cause this embolization. Napodano M. et al. already presented at the TCT 2005 his study, which showed that the number one cause of distal embolization in 54.7% of all cases performed was balloon pre dilation [3]. Since the publication of the TAPAS study, thrombus aspiration has become the technical gold standard of treating the primary artery; however whether the routine suction is effective in all patients, remains debatable [4]. Data provided by this study demonstrated that larger than 2 mm thrombus aspiration occurred in 18,4% of cases. Hence, it obvious, that this technique should be used when the thrombus is visible. We would call it selective aspiration because handling of large suction devices in situations of possible ineffective aspiration may cause further displacement of target thrombus, rupture of the plaque and spasm. In addition to the risk

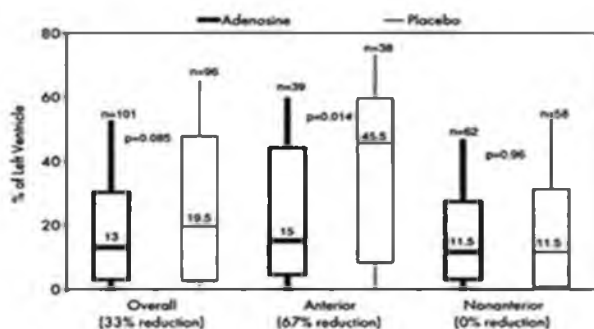


Fig. 3. Reperfusion injury: role of intracoronary Adenosine in primary PCI. The AMISTAD I trial. Реперфузионное повреждение: роль интракоронарного введения аденозина при экстренном эндоваскулярном вмешательстве. (Исследование AMISTAD I. Mahaffey K.W. et al. JACC. 1999; 34:1711-20).

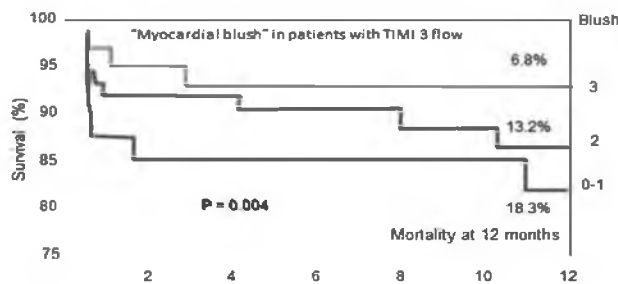


Fig. 2. Cumulative survival after PCI in 163 pts in whom TIMI - 3 flow was achieved by status of myocardial perfusion.

Выживаемость пациентов после эндоваскулярного вмешательства и достижения кровотока TIMI 3 в эпикардальных артериях в зависимости от перфузии миокарда. (Stone G.W. et al. JAAC. 39: 591-597).

of distal embolism, we must take into account the possibility of no-reflow phenomenon, especially in proximal LAD and dominant CD lesions. Both the AMISTAD and Marzilli M. studies (in patients with heart attack of less than three hours) have shown that the intracoronary infusion of adenosine, administered prior to the opening of the artery, first of all reduces the size of the infarction, especially of the front of the heart and decreases the incidence of no-reflow phenomenon associated with death and re-infarction [5; 6]. (Figure 3; Figure 4) We must also consider the importance of performing direct stent implantation without pre dilation, since this technique has been demonstrated to significantly reduce the incidence of adverse effects [7]. (Figure 5) All these different situations in which we find ourselves to more efficiently treat our patients; we have found a

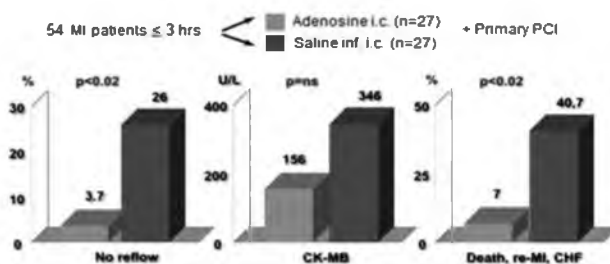


Fig. 4. Reperfusion injury: Role of intracoronary Adenosine in primary PCI. Реперфузионное повреждение: роль интракоронарного введения аденозина при экстренном эндоваскулярном вмешательстве. (Marzilli et al. Circulation. 2000; 101:2154-59).

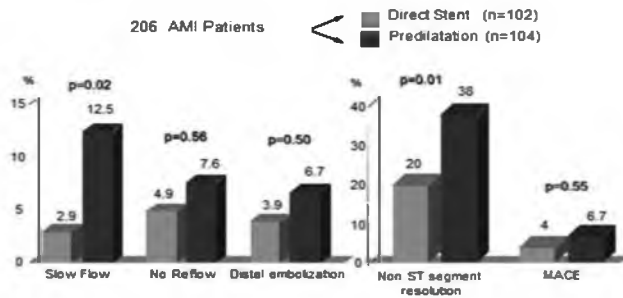


Fig. 5. Direct stent implantation vs predilatation in primary PCI.

Прямое стентирование и преддилатация при экстренном эндоваскулярном вмешательстве. (Loubeyre et al. JACC. 2002; 39: 15-21).



Fig. 6. The Amicath catheter (IHT-Cordynamic, Spain). Катетер Amicath (IHT-Cordynamic, Испания).

device that helps us to get an effective myocardial reperfusion The Amicath catheter (IHT-Cordynamic. Avda, Catalunya, 4 – 08185 LLisa de Vall, Barcelona, Spain). This is a multifunctional quick exchange catheter that has distal holes at its distal portion and 4 radioopaque marks with 10 mm interspaces between them which allows us to measure the length of the lesion. (Figure 6)

This device helps us prevent reperfusion injury in cases of TIMI 0 injury thanks to the distal administration of intracoronary adenosine prior to recanalization. In addition, we can inject the contrast medium through the distal holes which gives us information about the condition of the vessel in its distal part and enables us to see the thrombus burden during angiography and hence helps us determine the need for thrombus aspiration. When it is withdrawn, due to the "Dotter" effect, the artery is recanalized with establishment of TIMI 2-3 flow without balloon pre-dilatation in which case there is no need in aspiration. That is why a stent can be placed directly. To improve outcomes we can use this device to infuse both fibrinolytic agents or antiplatelet agents locally, which was the case in the INFUSE-AMI study, and if an inappropriate (0-1) blush score persists, we can inject vasodilators (such as NTP) distally [8].

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