The differences between PCI and Fibrinolytic therapy in Acute ST elevation Myocardial Infarction

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ANNOTATSIYA

So'nggi o'n yilllarda yurak ishemik kasalligi (YuIK) mehnatga layoqatli aholi orasida o'limning asosiy sababi bo'lib qolmoqda (Oganov R.G., Maslennikova G.Ya., 2013). Epidemiologik ma'lumotlarga ko'ra yurak qon tomir kasalliklari o'limning 20-42% ni tashkil etadi. Bulardan 51% yurak ishemik kasalliklariga

to’g’ri keladi. Oxirgi tadqiqotlar ushbu kasalliklarning patogenezini tushunishni sezilarli darajada kengaytirdi.

O’KS – o’tkir koronar sindrom ilk bor yuzaga kelgan stenokardiyadan tortib uzoq muddat davom etuvchi va nitroglitserin qabul qilganda ham yo’qolmaydigan, natijasi noaniq bo’lgan stenokardiyalar, ST elevatsiyasi bilan kechuvchi MI yoki to’satdan o’limga olib kelish ehtimoli yuqori bo’lgan, tinch holatda ham uzuliksiz avjlanib boruvchi davomli stenokardiyalarni o’z ichiga oladi.Bu atama kasalliklarning umumiy klinik belgilari bo’lgan ko’krak qafasidagi o’tkir og’riqlar, o’g’riqlarning xususiyatlari va turlicha terapevtik yondashuvlarni o’z ichiga oladi. ST segmentning o’rta chiziqdan turg’un ko’tarilishi bilan kechuvchi O’KS jiddiy oqibatlarga olib kelishi mumkin. Uning sabablari koronar tomirlardan birining to’liq yoki qisman berkilishiga olib keluvchi tromboz, koronar arteriyani yaqqol namoyon bo’lgan spazmi bo’lishi mumkin. Buning natijasida miokardda tarqalgan “chuqur” transmural ishemiya jarayoni yuzaga kelishi mumkin.

Kalit so'zlar: Perkutan koronar aralashuv (PCI), fibrinoliz, ST ko'tarilgan miokard infarkti, reperfuzion terapiya.

АННОТАЦИЯ

В последние десятилетия ишемическая болезнь сердца (ИБС) остается основной причиной смертности среди трудоспособного населения (Оганов Р.G. Масленникова Г.Я., 2013). По эпидемиологическим данным, сердечно-сосудистые заболевания составляют 20-42% смертей. Из них 51% приходится на ишемическую болезнь сердца. Последние исследования значительно расширили понимание патогенеза этих заболеваний.

ОКС-острый коронарный синдром включает в себя стенокардию от впервые возникшей стенокардии до продолжительной стенокардии с неопределенным исходом, которая не исчезает даже при приеме нитроглицерина, инфаркт миокарда с элевацией ST или продолжительную стенокардию с высокой вероятностью внезапной смерти, которая непрерывно прогрессирует даже в спокойном состоянии.

Термин включает в себя острую боль в груди, которая является общими клиническими признаками заболеваний, особенностями болей и различными терапевтическими подходами. ОКС, проходящая при устойчивом подъеме сегмента ST от средней линии, может иметь серьезные последствия. Его

причинами могут быть тромбоз, приводящий к полному или частичному закрытие одного из коронарных сосудов, ярко выраженный спазм коронарной артерии. Это может привести к процессу “глубокой” трансмуральной ишемии, которая распространяется в миокарде.

Ключевые слова: чрескожное коронарное вмешательство (ЧКВ), фибринолиз, инфаркт миокарда с подъемом сегмента ST, реперфузионная терапия.

ANNOTATION

In recent decades, coronary heart disease (CHD) remains the main cause of mortality among the employable population (Oganov R.G. Maslennikova G.Y., 2013). According to epidemiological data, cardiovascular diseases account for 20-42% of deaths. Of these, 51% account for coronary heart disease. Recent studies have significantly expanded the understanding of the pathogenesis of these diseases.

ACS-acute coronary syndrome includes angina pectoris from first-time angina pectoris to prolonged angina pectoris with an uncertain outcome, which does not disappear even when taking nitroglycerin, myocardial infarction with ST elevation or prolonged angina pectoris with a high probability of sudden cardiac death, which continuously progresses even in a calm state.The term includes acute chest pain, which is common clinical signs of disease, pain features and various therapeutic approaches. The ACS, which takes place with a steady rise of the ST segment from the midline, can have serious consequences. Its causes may be thrombosis, leading to complete or partial closure of one of the coronary vessels, clear spasm of the coronary artery. This can lead to the process of “deep” transmural ischemia, which spreads in the myocardium.

Key words: Percutaneous coronary intervention(PCI), Fibrinolysis, ST elevation myocardial infarction, Reperfusion therapy.

INTRODUCTION

Patients with severe and acute myocardial infarction (ie, ST-elevation myocardial infarction [STEMI]) require rapid diagnosis and treatment to reduce the risk of death and permanent myocardial injury (1).

The primary goal of STEMI management is to reduce the risk of death and the extent of permanent cardiac injury associated with MI. Because therapy for patients with STEMI becomes less effective with each minute its delivery is delayed, another goal of therapy is to rapidly treat patients with STEMI before treatment becomes ineffective. The rapid diagnosis of STEMI only requires the presence of symptoms suspicious for an ACS (eg, chest discomfort, dyspnea, sudden death) and a confirmatory ECG; it does not require evidence of elevated cardiac biomarkers such as troponin.

Characteristic symptoms and signs – The following signs and symptoms suggest the presence of STEMI:

- Chest pain or chest discomfort
- Dyspnea
- Ventricular arrhythmias, cardiac arrest, or syncope
- Atypical symptoms such as malaise, weakness, and back pain
- **ECG findings** – ECGs should be reviewed for signs of severe myocardial ischemia, which include:
- ST-segment elevation with standard lead placement
- Newly identified left bundle branch block
- ST elevation with posterior or right-sided lead placement
- Other high-risk ECG findings (eg, de Winter sign, transient ST-segment elevation)

For most patients with acute ST-elevation myocardial infarction (STEMI), coronary artery reperfusion of the infarct-related artery with either primary percutaneous coronary intervention (PCI) or fibrinolytic therapy reduces mortality compared with no reperfusion. As the benefits of reperfusion decline rapidly with time, reperfusion should be implemented as soon as possible.

Most patients with acute STEMI should receive immediate reperfusion therapy with either fibrinolytic therapy or primary percutaneous coronary intervention (PCI). Relative to no reperfusion, reperfusion lowers the risk of death. Direct supporting evidence comes from early randomized trials that

compared fibrinolytic therapy to no reperfusion and indirect evidence from trials comparing fibrinolysis to balloon angioplasty or stenting.

With regard to the former, a 1994 meta-analysis found that the absolute mortality reduction from fibrinolytic therapy at five weeks was 3 percent for those presenting

within six hours from symptom onset, 2 percent for those presenting within 7 to 12 hours, and a nonsignificant 1 percent for those presenting within 13 to 18 hours (2). The net effect in major fibrinolytic trials was an approximately 30 percent reduction in short-term mortality to a value of 7 to 10 percent.

Primary PCI may be preferred for some patients even when it cannot be performed in a timely manner. Examples of patients for whom even delayed PCI (>120 minutes from first medical contact) is preferred include those in whom the diagnosis is in doubt, those at high bleeding risk, and those at high risk of death such as those in cardiogenic shock.

Evidence — Initial evidence to support the preference for primary PCI comes from randomized trials of fibrinolysis compared with balloon angioplasty (3-6). In the aggregate, these trials found about a 2 percent lower absolute risk of death with balloon angioplasty (7). This evidence was followed by studies showing that PCI with stenting lowers the rate of death, nonfatal reinfarction, or stroke compared with balloon angioplasty (8). Finally, primary PCI with stenting was directly compared with fibrinolysis in multiple randomized trials (DANAMI-2, PRAGUE-2, AIR PAMI, STAT, STOPAMI-1, and STOPAMI-2) (9-17). In these studies there was a trend toward a lower risk of death with PCI versus fibrinolysis and a lower risk of recurrent myocardial infarction (MI).

A large 2009 meta-analysis of randomized controlled trials (RCT) and observational studies (OS), which compared primary PCI (with balloon angioplasty or stenting) to fibrinolysis, came to the following conclusions (18):
Primary PCI was associated with significant relative risk reductions in short-term (≤6 weeks) mortality of 34 percent in RCT and 23 percent in OS.
Primary PCI was associated with significant reductions in long-term (>1 year) mortality of 24 percent and reinfarction of 51 percent in RCT.
Diagnosis in doubt — In patients who present with signs and symptoms that are suggestive but not diagnostic of STEMI, primary PCI is preferred over fibrinolysis even when PCI will be associated with additional delays >30 minutes such as in patients who need be transferred from one facility to another. Examples include patients with nondiagnostic or borderline features on the electrocardiogram (ECG) or those with an ECG suggesting STEMI but an atypical history (eg, pericarditis).

In some clinically stable patients where the diagnosis is in doubt and the physician believes that the time delay associated with performing echocardiography does not exceed the harm in delaying reperfusion, we consider performing immediate echocardiography. An echocardiogram with findings consistent with acute MI should lead to immediate angiography. A normal echocardiogram may warrant an expectant approach, particularly amongst those who are not exhibiting electrical or hemodynamic instability or those who have increased risk from anticoagulation or coronary intervention.

High bleeding risk — Fibrinolytic therapy carries a greater risk of major (and minor) bleeding compared with primary PCI. Intracranial hemorrhage is the most serious of these risks and occurs in approximately 0.7 percent of patients treated with fibrinolytics (19,20). Although there are no randomized data specific to a high bleeding risk population, such patients appear to benefit more from primary PCI (21). Given the excess risk of fibrinolysis in this population, it is likely PCI would have greater benefit than fibrinolysis even if treatment delays exceed 30 minutes.

Anticipated PCI delay — PCI should be performed within 120 minutes of first medical contact and ideally within 90 minutes. Among patients who have anticipated treatment delays for primary PCI, we consider fibrinolysis if it can be administered within 30 minutes of the anticipated PCI delay. Even among patients who might be considered for fibrinolysis based on timing, primary PCI is preferred in several settings, including the presence of contraindications to fibrinolysis, very high-risk patients, and those with late presentation. A 2020 registry propensity-matched study comparing a pharmaco-invasive strategy with late primary PCI (>120 minutes from diagnosis) in over 4000 STEMI patients found better five-year survival with the former (89.8 versus 79.5 percent; adjusted hazard ratio 1.51, 95% CI 1.13-2.02) (22).Very high-risk patients — The benefits of primary PCI over fibrinolysis are greater in very high-risk (of death) patients, including those patients with cardiogenic shock. This point was illustrated in an analysis of 16 randomized trials that compared primary PCI with or without stenting with fibrinolysis (23). In this study, an increase in baseline mortality risk from 4.4 to 12.4 percent allowed for an increase in the acceptable PCI-related delay (equipoise) from 43 to 200 minutes.

As a result, transfer for PCI, even with a delay, is generally favored over fibrinolysis for patients with severe heart failure and/or pulmonary edema or those deemed to be at high risk on the basis of models such as the TIMI risk score (10,24). Very high-risk patients should receive primary PCI as soon as possible and within 120 minutes of first medical contact.

Late presentation — Late presentation refers to patients who present more than 12 hours after the onset of symptoms. Registry data suggest that late presentation occurs in 9 to 31 percent all STEMI patients (21,25). In patients who present more than 12 hours after symptom onset, primary PCI may be of benefit if evidence of ongoing myocardial ischemia is present. Fibrinolytic therapy administered at this time is not likely to improve outcomes and carries with it the risk of serious bleeding, and we generally do not recommend it.

In asymptomatic, stable patients who present after 12 hours, there is no evidence that reperfusion with either fibrinolytic therapy or primary PCI is of benefit. Although there is little evidence, possible exceptions include patients who present after more than 12 hours (and up to 24 hours) and who have a larger area of myocardium at risk, hemodynamic instability, or ongoing ischemic symptoms and for whom PCI is not available (26,27).

In the STREAM trial, 1892 patients who presented within three hours were randomly assigned to undergo either fibrinolytic therapy with bolus tenecteplase or primary PCI (28). Patients who could undergo PCI within one hour were excluded. In the lytic group, coronary angiography was performed urgently for evidence of

reperfusion failure or routinely at 6 to 24 hours. There was no difference in the primary composite end point (death, shock, congestive heart failure, or reinfarction up to 30 days) between the two groups (12.4 versus 14.3 percent, respectively; relative risk 0.86, 95% CI 0.68-1.09). The rates of intracranial hemorrhage were 1.0 and 0.2 percent before a protocol amendment allowed for a lower dose of lytic for patients ≥75 years. At one year, there was no difference in the rates of all-cause mortality: 6.7 versus 5.9 percent, respectively (risk ratio 1.13, 95% CI 0.79-1.62) (29).

In STREAM, the time to reperfusion with fibrinolysis (tenecteplase) was shortened and arescue PCI. With this strategy, patients treated with early fibrinolysis or primary PCI had a similar incidence of adverse outcomes at 30 days. Moreover, only 36 percent of patients underwent rescue PCI and 64 percent had an elective coronary angiogram and PCI within 24 to 48 hours. Persistence of symptoms or lack of ST-segment resolution should prompt rescue PCI. Limitations of STREAM include protocol change and an older approach to the use of antithrombotic therapies. While fibrinolysis leads to efficacy outcomes comparable to primary PCI in patients who present early (such as in STREAM), we prefer the latter due to concerns about the safety (eg, intracranial hemorrhage) of lytic therapy. Failed fibrinolysis or threatened reocclusion — For patients with evidence of failed fibrinolysis or threatened reocclusion, as manifested by findings such as persistent or recurrent chest pain, ST-segment elevation, or hemodynamic or electrical instability, including those with cardiogenic shock, we recommend immediate PCI, also known as "rescue PCI."

SUMMARY AND RECOMMENDATIONS

●Coronary artery reperfusion with either primary percutaneous coronary intervention (PCI) or fibrinolytic therapy improves clinical outcomes in nearly all groups of patients with an acute ST-elevation myocardial infarction (STEMI) who present within 12 hours of symptom onset. For these patients, we recommend reperfusion therapy compared with no reperfusion.

●For most STEMI patients who present within 12 hours of symptom onset, we recommend primary PCI rather than immediate fibrinolysis if PCI can be delivered within 120 minutes of first medical contact by skilled practitioners.

We prefer to have patients undergo PCI within 90 minutes if possible.For patients who cannot receive timely primary PCI, fibrinolytic therapy should be given. Fibrinolytic therapy should be administered within 30 minutes of arrival at the hospital, and as soon as 10 minutes if possible. Most of these patients should undergo diagnostic coronary angiography and PCI within 3 to 24 hours depending upon time of day and other circumstances.

●For patients who present after 12 hours (and up to 24 hours) of symptom onset and have evidence of ongoing ischemia, we suggest PCI as opposed to no reperfusion therapy.

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