Clinical Perspectives

Management of myocardial infarction: the proper priorities

Introduction

At the European Congresses of Cardiology in Amsterdam (1995) and Birmingham (1996), and at recent American meetings, large audiences were drawn to presentations and discussions about direct percutaneous transluminal coronary angioplasty and stenting for acute myocardial infarction. Apparently this topic appeals to many cardiologists, and the procedure is being performed in many hospitals worldwide. In Rotterdam, we receive an increasing number of telephone calls from cardiologists in hospitals without facilities for coronary intervention, who wish to transfer their patients for either direct percutaneous transluminal coronary angioplasty or rescue percutaneous transluminal coronary angioplasty. This pressure for percutaneous transluminal coronary angioplasty in patients with evolving myocardial infarction is, in our opinion, not appropriate! First, because data supporting the superiority of direct percutaneous transluminal coronary angioplasty over thrombolysis is limited and second because the attention should be focused more on other procedures which may have a greater impact on survival in patients with myocardial infarction, in particular very early pre-hospital therapy.

Limited proof of superiority of direct percutaneous transluminal coronary angioplasty

In recent decades a consensus has developed that different treatment regimens should be compared in adequately sized randomized trials. Accordingly, large randomized trials have been conducted to document the efficacy of thrombolytic therapy vs control, and to compare various regimens for such a therapy. The value of thrombolytic therapy had been documented in a series of medium sized[1-4], larger[5] and very large trials[6,7] and a close relationship between early coronary patency, myocardial salvage and survival has been established[8-11]. In experienced hands, direct percutaneous transluminal coronary angioplasty offers a higher rate of reperfusion than currently available regimens for thrombolytic therapy. However, the total number of patients in randomized comparisons of direct percutaneous transluminal coronary angioplasty vs thrombolysis is only about 2300. In the two landmark studies, early mortality was markedly reduced from 6.4% to 2.5%[12,13]. These studies were conducted by dedicated investigators and equally dedicated nursing staff. In haemodynamically unstable patients, the cardiologist performing percutaneous transluminal coronary angioplasty was assisted by a cardiac anaesthetist to optimize respiration and haemodynamics. In about 5% of patients, direct angioplasty was judged to be inappropriate, and patients were referred for immediate coronary bypass surgery. Apparently, such additional facilities are required for optimal performance of direct angioplasty. The results of seven other smaller studies were less favourable[14-20]. Furthermore, several reports from community hospitals indicate that the results obtained in the trials cannot always be reproduced[21,22]. A pooled analysis of all 1214 patients randomized prior to GUSTO-IIb yielded a 40% reduction in mortality, which was just statistically significant.

In comparison with the earlier randomized trials, GUSTO-IIb was larger, with 1138 patients from 57 hospitals in Europe, North America and Australia. The reference therapy was accelerated tissue type plasminogen activator, which is currently the most effective thrombolytic regimen[23]. In the final analysis, death (5.7 vs 7.0%), reinfarction (4.5 vs 6.5%) and disabling stroke (0.2 vs 0.9%) were reduced in the direct percutaneous transluminal coronary angioplasty group (all statistically not significant), with a significant reduction in the combined primary endpoint (9.6 vs 13.7%; P=0.033). In contrast with previous studies, the advantage of direct percutaneous transluminal coronary angioplasty became apparent only after the 6th day, an unexpected and as yet unexplained finding[24]. The results of the GUSTO-IIb angioplasty study are consistent with previous studies[12-20], but less favourable. These combined results support the use of direct percutaneous transluminal coronary angioplasty as an alternative for thrombolysis in experienced, well organized centres. However, the results do
Focus on very early therapy

It would be an error of judgement to focus attention primarily on direct (or primary) percutaneous transluminal coronary angioplasty. Other strategies, which can already be implemented on a large scale, require as much, and probably more, attention. The greatest mortality reduction can be achieved by very early treatment, within 1–3 h after the onset of symptoms (Fig. 1). Therefore, the public, and in particular patients with known coronary disease, should be made aware of the symptoms of a ‘heart attack’ and the value of immediate therapy. In all communities ‘early warning systems’ should be encouraged. Patients should be offered an easy and rapid access to medical therapy. Studies in different communities have shown that greater awareness does indeed reduce the patient delay.

In addition to early warning, a rapid response system must be developed. This might include equipping emergency ambulances with ECG monitoring devices, defibrillators and 12-lead diagnostic electrocardiography systems. In addition, there should be provision for on site (computer) interpretation or immediate radio transfer of the ECG to a central base station for interpretation. Several systems have been developed for immediate pre-hospital initiation of thrombolytic therapy, either by ambulance-based physicians or by trained ambulance nurses and paramedics. More than a decade ago, it became accepted that nurses in coronary care units, but also in ambulances and other hospital departments, should be familiar with basic life support as well as advanced life support, including ECG rhythm diagnosis and defibrillation. Nowadays protocols have been developed which allow nurses to administer intravenous therapy as required for severe chest pain, shock, and asthma cardiale. Such interventions have a major impact on patient comfort and stability. Similarly, nurses can be easily trained to administer thrombolytic therapy to selected patients.

Unfortunately, considerable treatment delay occurs in many hospitals. Measures should be installed to prevent such delay. Patients arriving at hospital with an established diagnosis of evolving myocardial infarction from pre-hospital electrocardiography will receive more rapid and better care than those arriving with symptoms of chest pain only. The diagnosis of evolving myocardial infarction can often be confirmed by immediate electrocardiography,
particularly using computer interpretation. It is obvious that computer algorithms will not be accurate in all patients, for example, when other ECG abnormalities are present, and when ST segment elevation is limited. Nevertheless, the patients which benefit most from rapid therapy are those with extensive myocardial infarction, usually characterized by extensive ST segment elevation on the electrocardiogram\[29,30\]. In such patients, false-positive diagnoses are rare. In a consecutive series of 529 patients with a pre-hospital diagnosis of evolving myocardial infarction false-positives occurred in seven patients only\[26\].

The guidelines of the European Society of Cardiology recommend that in-hospital treatment delay (door to needle time) should be less than 20 min\[31\]. In each hospital, a registry should be kept of such delays, and specific measures taken whenever the delays exceed these recommendations. Major sources of in-hospital delay are procedures for consultation of a cardiologist, or another specialist, prior to initiation of therapy and transport from the emergency room to a coronary care unit where therapy is subsequently administered. In the presence of extensive ST segment elevation on the electrocardiogram, no time should be lost with such consultation. The emergency physician, and even nurses (if no physician would be immediately available) should have a mandate and an obligation to initiate therapy immediately. In most cases, it will be appropriate to initiate therapy in the emergency department, followed by transfer to a coronary care unit. Deferment of therapy until the patient is in the coronary care unit often causes unnecessary delay. Time is muscle, every minute counts!

**Conclusion**

Time is muscle, and muscle is life. Very early reperfusion therapy, particularly during the first few hours after the onset of symptoms, will salvage a significant portion of ischaemic myocardium which would otherwise be lost. Early initiation of therapy is more important than the choice of therapy itself. In coming years, new regimens for thrombolytic therapy will become available, including combinations of thrombolytic agents, specific platelet GP IIb-IIIa receptor blockers, specific antithrombins and other compounds. Large studies will address the relative value of different modes of therapy including thrombolysis, direct percutaneous transluminal coronary angioplasty, and stents. These are important developments. However, attention to such newer therapies should not distract physicians from the need for rapid diagnosis and immediate initiation of therapy, particularly in patients with extensive evolving myocardial infarction who often can be identified easily.

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**Table 1 Priorities for reperfusion therapy**

| 1. Patient education |
| 2. Public education |
| 3. Pre-hospital diagnosis and therapy |
| 4. Procedures in hospital to avoid delay |

**References**


Should patients with suspected acute myocardial infarction without ST elevation be given thrombolytic treatment?

Large randomized trials have shown beyond reasonable doubt that thrombolytic therapy reduces the mortality rate in patients with suspected acute myocardial infarction. The greatest and most certain benefit is in those with anterior infarction and ST elevation on the presenting electrocardiogram (ECG). The recommendation that patients with suspected acute myocardial infarction and ST elevation be given thrombolytic therapy is thus supported by the trial evidence, most strongly for anterior infarction. While this recommendation is being generally followed, so also is the converse: patients with suspected acute myocardial infarction without ST elevation are not being given thrombolytic therapy. Since the latter are as numerous as the former, we need to consider whether the practice of withholding thrombolytic treatment from those

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