

In Norway, only the University hospitals in Oslo, Bergen, Trondheim and Stavanger provide 24 h all year acute PCI coverage. At the Stavanger University Hospital, the interventional cardiologists in 2004 performed 1978 angiographic evaluations and 744 Percutaneous Coronary Interventions (PCI). Of these, 240 were primary PCI (PCI for acute ST elevation Myocardial Infarction).

Antman EM et al.

**ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines.** *J Am Coll Cardiol* 2004; 44: 671-719.

A joint task force of the American College of Cardiology and American Heart Association has published new guidelines on the management of patients with ST-segment-elevation myocardial infarction (STEMI). The guidelines incorporate changes in the approach to STEMI and knowledge gained since 1999. Selected Class 1 recommendations that pertain to emergency department management are capsulized below:

- Emergency medical services personnel should administer aspirin, unless contraindicated, to patients with chest pain.
- A 12-lead electrocardiogram should be performed and read within 10 minutes after patient arrival.
- Right-sided ECG leads should be obtained in cases of inferior STEMI.
- Patients who present later than 3 hours after symptom onset should receive percutaneous coronary intervention (PCI), when it can be performed within 90 minutes after first medical contact. Otherwise, patients should receive fibrinolytic therapy, unless contraindicated (e.g., for high risk for intracranial hemorrhage).
- Patients who present within 3 hours of symptom onset should receive fibrinolytic therapy if the difference between expected door-to-balloon time and door-to-needle time is longer than 60 minutes, and they should receive PCI if the difference is fewer than 60 minutes.
- Time from initial medical contact to fibrinolytic therapy

should be shorter than 30 minutes; time from first medical contact to PCI should be shorter than 90 minutes.

- Primary PCI is recommended for patients with congestive heart failure.
- Initial STEMI treatment should be determined by an emergency physician.
- Treatment initiation should not depend on biomarker test results.
- Chest x-rays should be obtained but should not delay initiation of therapy.
- Patients with ongoing chest pain should receive nitroglycerine.
- Aspirin, if not given en route, and  $\beta$ -blockers should be given promptly after arrival to patients without contraindications.
- Unfractionated heparin should be given as a bolus of 60 U/kg (maximum, 4000 U) followed by an infusion of 12 U/kg/hour (max, 1000 U/hour) to patients who receive alteplase, tenecteplase, or reteplase.
- Patients younger than 75 with shock secondary to STEMI should be transferred for PCI within 18 hours after shock onset.
- Patients with contraindications to fibrinolytic therapy should be transferred for PCI within 30 minutes after arrival.

**Comments:** The new guidelines from the ACC/AHA are in accordance with the ESC 2003 guidelines. (*European Heart Journal* 2003;24:28-66) Aspirin and betablockers should be administered, and PCI performed by an experienced invasive team within 90 minutes after debut of symptoms. The recommendations of a task force for primary PCI are recently published in *HEART* (*Heart*;2004;90:1-13).

De Luca G et al.

**Time-to-treatment significantly affects the extent of ST-segment resolution and myocardial blush in patients with acute myocardial infarction treated by primary angioplasty.** *Eur Heart J* 2004; 25: 1009-1013.

The relation between time-to-treatment and outcomes is not as clear for angioplasty as for fibrinolytic therapy. The authors of this Dutch study analyzed data for 1072 patients who presented within 6 hours after the onset of symptoms of ST-segment-elevation MI (STEMI) to quantify the relation between

time-to-treatment (defined as time from onset of symptoms to first balloon inflation) and outcome. After adjustment for age, sex, diabetes, and preprocedural flow, time-to-treatment was significantly associated with ST-resolution ( $P < 0.001$ ) and postprocedural perfusion ( $P < 0.001$ ).

**Comments:** This study confirms the importance of early reperfusion as documented in numerous studies before. In addition the significance of myocardial blush grade (MBG) is documented. MBG is a description of myocardial micro circulation as assessed by grey tones in the myocardium after intracoronary contrast injection. The results in the present study are in accordance with the results from the EMERALD study presented at the TCT 2004 in Washington, USA. The EMERALD investigators showed that mortality was highest in the group of patients with the lowest MBG. This further underlines the importance of both an open epicardial coronary artery and improved microcirculation after successful treatment in patients presenting with acute myocardial infarction.

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Taher T et al.

**Aborted myocardial infarction in patients with ST-segment elevation.** *J Am Coll Cardiol* 2004; **44**: 38-43.

Early fibrinolytic therapy has been shown to avoid myocardial necrosis in some patients with ST-segment-elevation MI (STEMI). To learn more about this outcome, investigators conducted a substudy of the ASSENT-3 trial, a comparison of three antithrombotic regimens as adjuncts to tenecteplase in 6095 patients with STEMI. They evaluated serial creatine kinase measurements and ECGs obtained at baseline and at 60 and 180 minutes after treatment for the 5470 patients who survived for 24 hours and for whom complete data were available.

Overall, 727 patients (13.3%) had aborted MI, defined as maximal creatine kinase level less than or equal to two times the upper limit of normal combined with typical evolutionary ECG changes. Patients who had neither a rise in serum

markers nor evolutionary ECG changes were considered to have masquerading MI (111) and were not included; diagnoses in these patients included early repolarization (23%), left bundle branch block (14%), pericarditis (5%), previous MI with persistent ST-segment elevation (14%), and nondiagnostic ST-T wave changes (38%).

Factors associated with aborted MI included shorter time from symptom onset to treatment. Aborted MI occurred in 25% of patients treated within 1 hour after symptom onset, 17% of those treated in 1 to 2 hours, and 14% of those treated in 2 to 3 hours. After adjusting for baseline characteristics, patients with aborted MI had significantly lower mortality rates than those with true MI at 30 days (odds ratio, 0.76) and 1 year (OR, 0.70).

**Comments:** A diagnosis of aborted myocardial infarction is usually defined as the combination of chest pain, transient ECG changes suggesting transmural ischaemia and CK or CK-MB fraction concentrations that do not increase by more than double the normal concentration. In addition some authors include the cumulative ST segment elevation and depression decreased to < 50% of the value at presentation within two hours of treatment.

This study adds to the "golden hour hypothesis". Time is muscle. The highest frequency of aborted myocardial infarction occurred in the group of patients who were treated within an hour, and the mortality was lowest in the group of patients with aborted AMI compared to patients with true AMI. Several studies have documented the importance of early reperfusion. The results of this study are also in accordance with a recently published study that documented that prehospital thrombolysis was associated with a fourfold increase of aborted myocardial infarction compared with in-hospital treatment.

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Sutton AG et al.

**A randomized trial of rescue angioplasty versus a conservative approach for failed fibrinolysis in ST-segment elevation myocardial infarction: The MERLIN trial.** *J Am Coll Cardiol* 2004; **44**: 287-296

The value of angioplasty for patients with ST-segment-elevation MI (STEMI) after presumed failure of reperfusion with fibrinolytic therapy has been debated since its invention. In this U.K. trial, 307 patients who failed to respond to fibrinolytic therapy (defined as failure of the maximal ST-segment elevation to have resolved by 50% at 60 minutes) were randomized to urgent transfer for angioplasty or conservative treatment. In the conservative-treatment arm, standard medical

therapy was given at the discretion of the treating clinician, but repeat fibrinolysis was discouraged; angiography and revascularization were allowed for recurrent ischemia or after a positive stress test. All patients presented within 10 hours after pain onset and had typical STEMI ECG changes. Nearly all patients received streptokinase. The mean time from the 60-minute ECG to angiography was 85 minutes.

**Comments:** The authors of the present study (MERLIN) concluded that rescue angioplasty did not improve survival or preservation of left ventricular systolic function by 30 days. In addition it was associated with increased amount of adverse events. There are conflicting results from previous trials on this issue. However, the Rescue Angioplasty vs Conservative Treatment or Repeat Thrombolysis (REACT) trial presented at the American Heart Association Scientific Sessions 2004 concluded that the incidence of any event was reduced by almost half in the rescue-PCI group compared with either the repeat-lysis or conservative-therapy groups at six months. The missing advantage of rescue PCI in the MERLIN trial was commented in an editorial. It pointed out that the study was underpowered. The discrepancy may also be explained by the fact that the patients in the MERLIN trial were older and had longer delay times before rescue PCI. In the REACT trial there was a 10-fold higher use of GP IIb/IIIa inhibitors and a higher use of stents. This means that in addition to MI patients with ongoing chest pain or hemodynamic collapse, patients who fail to achieve a > 50% resolution of ST changes a 90-minute ECG should be candidates for immediate rescue PCI.

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Burton JH et al.

### **Electrical cardioversion of emergency department patients with atrial fibrillation.**

*Ann Emerg Med* 2004; **44**: 20-30.

Emergency physicians commonly encounter patients with atrial fibrillation.

Treatment varies from simple rate control to cardioversion to restore normal sinus rhythm. In this retrospective study, investigators evaluated the success of emergency department electrical cardioversion in 388 patients with stable AF (no chest pain, dyspnea, altered mental status, or shock) who underwent the procedure at four EDs. Physicians selected a management plan for each patient; no standardized sedation or cardioversion guidelines were provided. The AF episode lasted from 1 to 5 hours in 48% of patients and for longer than 48 hours in 1%. All patients with episodes longer than

48 hours were given warfarin. Most patients (72%) had experienced prior episodes of AF. Overall, 332 patients (86%) were successfully cardioverted to normal sinus rhythm in the ED. Of these, 301 (91%) were discharged and the others were hospitalized, with 5 (1%) admitted to an intensive care unit. Of the 56 patients whose cardioversions were unsuccessful, 31 (55%) were discharged and 9 (16%) required ICU admission. Six complications associated with electrical cardioversion were noted: burns (3 cases), ventricular tachycardia (2), and bradycardia (1). Twenty-two complications from sedation and analgesia were identified: desaturation (12 cases), need for ventilation assistance (6), emesis (1), hypotension (1), bradycardia (1), and agitation (1).

**Comments:** Atrial fibrillation is the most common sustained cardiac rhythm disorder, with an incidence of 2 % in persons over 22 years of age. Maintenance of sinus rhythm is preferable. The need for cardioversion can be immediate as in acute HF, hypotension, or worsening of angina pectoris in a patient with CAD. However, cardioversion also carries a risk of thromboembolism. This risk appears to be greatest when the arrhythmia has been present more than 48 h. In the present study the authors demonstrate the efficacy of Emergency Department electrical cardioversion in stable patients with duration of atrial fibrillation shorter than 48 hours. An obvious benefit was the reduction in hospitalizations. Would this work in the Scandinavian countries?

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Ray WA et al.

### **Oral erythromycin and the risk of sudden death from cardiac causes.**

*N Engl J Med* 2004; **351**: 1089-1096.

Oral erythromycin prolongs cardiac repolarization. Because it is metabolized by cytochrome P-450 3A (CYP3A), drugs that inhibit CYP3A-mediated metabolism can raise erythromycin levels. To determine whether the interaction between erythromycin and CYP3A inhibitors (e.g., calcium-channel blockers) is associated with sudden death among patients taking both agents, these authors analyzed Tennessee Medicaid patient and pharmacy records from 1988 through 1993 (before introduction of azithromycin and widespread use of clarithromycin). Amoxicillin use also was reviewed to control for confounding by indications for antimicrobial use.

The records covered 1.25 million patient-years and 1476 cases of sudden death from cardiac causes. The rate of sudden death among patients currently using erythromycin alone (i.e., not with CYP3A inhibitors) was twice as high as that among patients who had not used either erythromycin or amoxicillin. Rates were not increased in former users of erythromycin or current users of amoxicillin. Among patients taking erythromycin concurrently with CYP3A inhibitors, the rate of sudden death was five times higher than that among patients who were not taking either agent. Rates were not increased in patients taking amoxicillin concurrently with CYP3A inhibitors or in those taking CYP3A inhibitors alone.

**Comments:** The present study confirms previous data on the adverse events associated with the use of oral erythromycin. The current study provided no direct data with regard to the mechanisms. However, most investigators think the concurrent use of erythromycin and CYP3A inhibitors results in an increase in the plasma erythromycin concentrations, which in turn increases the risk of QT prolongation and serious ventricular arrhythmias. This is an important study because erythromycin is still widely used.

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Wan S et al.

**Thrombolysis compared with heparin for the initial treatment of pulmonary embolism: A meta-analysis of the randomized controlled trials.** *Circulation* 2004; **110**: 744-749.

The usefulness of fibrinolytic therapy for initial treatment of patients with pulmonary embolism (PE) who are not in shock is controversial. These authors conducted a meta-analysis of data from randomized trials that compared thrombolysis to heparin as initial treatment for PE.

Eleven trials involving 748 patients met inclusion criteria. In pooled analyses, rates of recurrent embolism or death (6.7%

in the fibrinolysis group and 9.6% in the heparin group), death (4.3% and 5.9%), and major bleeding (9.1% and 6.1%) did not differ significantly between groups. In the five trials that included hemodynamically unstable patients, the fibrinolysis group had significantly lower rates of death (6.2% and 12.7%) and recurrent PE (3.9% and 7.1%). In the studies that excluded hemodynamically unstable patients, not even a hint of potential benefit from fibrinolytic therapy was detected.

**Comments:** Pulmonary embolism (PE) is a major international health problem with an estimated incidence of 1 per 1000. However, the diagnosis is often difficult to obtain. The mortality in patients with untreated pulmonary embolism is approximately 30% and is directly related to the size and number of emboli and the pre-existing cardiac and respiratory status. Modern, adequate treatment may reduce the mortality to 2–8%. In the current paper the authors conclude that stable patients should not be treated with fibrinolysis, whereas patients with compromised hemodynamics may have benefit of this aggressive pharmacotherapy. This is in accordance with the recommendations of the European Society of Cardiology. Thrombolytic therapy is indicated only in patients with massive pulmonary embolism. (*European Heart Journal* 2000; **21**: 1301-1336)

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Donnino MW et al.

**Prevalence of elevated troponin I in end-stage renal disease patients receiving hemodialysis.**

*Acad Emerg Med* 2004; **11**: 979-981.

Although troponins are cleared renally, a previous study showed that the prognostic value of cardiac troponin elevation in patients with suspected acute coronary syndrome (ACS) is independent of renal function. In the current study, researchers assessed whether patients with renal failure but without symptoms of ACS might have “false-positive” elevations of serum troponin. Over a 2-week period, researchers

prospectively measured cardiac troponin-I (cTnI) levels in 113 asymptomatic renal failure patients who were receiving routine hemodialysis. Serum was collected from each patient before and after dialysis. Predialysis cTnI levels ranged from 0.0 to 0.7 ng/dL, and postdialysis levels ranged from 0.0 to 0.6 ng/dL. No patient had an elevated cTnI level, defined a priori as 0.8 ng/dL or higher.

**Comments:** This finding is in accordance with recently published reviews (*Nephron Clin Pract* 2004;98:87-92, *Can J Cardiol* 2004;20:1212-8).. The authors concluded that cTnI is unlikely to be falsely elevated in patients with chronic renal insufficiency and hemodialysis without acute coronary syndrome. Elevated cTnI levels in asymptomatic HD patients may be related to chronic myocardial damage and decreased clearance, and are of prognostic value. cTnI rise above the individual baseline is diagnostic of acute myocardial injury in patients with ACS.

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