Increased time from assessment to angioplasty was associated with an increased 30-day mortality rate

Berger PB, Ellis SG, Holmes DR Jr, et al., for the GUSTO-II Investigators. **Relationship between delay in performing direct coronary angioplasty and early clinical outcome in patients with acute myocardial infarction. Results from the Global Use of Strategies to Open Occluded Arteries in Acute Coronary Syndromes (GUSTO-IIb) Trial.** Circulation. 1999 Jul 6;100:14-20.

QUESTIONS

For patients hospitalized with myocardial infarction (MI), are delays in time from evaluation in the emergency department to percutaneous transluminal coronary angioplasty (PTCA) associated with 30-day mortality? What is the time to PTCA?

DESIGN

Cohort study using data from a randomized, double-blind, placebo-controlled trial.

SETTING

{57 hospitals in 9 countries.}*

PATIENTS

522 patients (mean age 63 y, 75% men) who had had symptoms of an acute MI for < 12 hours were allocated to PTCA. {Exclusion criteria were treatment with warfarin, active bleeding, history of stroke, hypertension, renal insufficiency, contraindications to heparin, potential for pregnancy}*, or mis-sing data on timing of procedures.

ASSESSMENT OF RISK FACTORS

Patients were divided into groups based on time in minutes from study entry to first PTCA with balloon inflation: ≤ 60 minutes (n = 104), 61 to 75 minutes (n = 109), 76 to 90 minutes (n = 76), > 90 minutes (n = 140), and PTCA not done (n = 93). Data used in adjustment of analyses included age; weight; height; race; sex; family history of coronary artery disease; hypertension; diabetes; peripheral vascular disease; hypercholesterolemia; smoking status; previous angina, MI, cerebrovascular disease, PTCA, or coronary artery bypass grafting; blood pressure; heart rate; baseline Killip class; and time from symptom onset to study entry.

MAIN OUTCOME MEASURES

30-day, all-cause mortality.

MAIN RESULTS

The median time from enrollment to PTCA was 76 minutes. (Minutes from symptom onset to enrollment ranged from 94 to 275 min.) The 30-day mortality rate increased for each successive period of delay (1.0% for ≤ 60 min, 3.7% for 61 to 75 min, 4.0% for 76 to 90 min, 6.4% for > 90 min, and 14.1% for patients who did not receive PTCA; P = 0.001 for trend). Each interval was associated with an increased risk for death at 30 days (odds ratio [OR] for movement from each interval to the next, 1.6; 95% CI 1.1 to 2.3). Increased age was associated with an increased risk for death (OR for each 7-y increase in age, 1.6; CI 1.2 to 2.1). The data on mortality rates and time from symptom onset to PTCA were not linear (0% for symptoms ≤ 90, 6.7% for 91 to 120, 1.1% for 121 to 180, 3.5% for 181 to 240, 6.9% for 241 to 300, and 4.9% for > 300 min).

CONCLUSION

For patients with MI, increased time spent in the hospital before PTCA was associated with increased 30-day mortality.

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*GUSTO-IIb Investigators. N Engl J Med. 1996;335:775-82.

COMMENTARY

The importance of early reperfusion in decreasing mortality in patients with MI is well accepted, but controversy persists over the best method to achieve patency of an infarcted artery. Proponents of primary angioplasty note the greater likelihood of achieving complete reperfusion with PTCA than with thrombolysis as well as the lower risk for cerebral hemorrhage. Despite these documented advantages, a substudy of the GUSTO-II study failed to show a mortality benefit for PTCA over thrombolysis at 6 months (1). The current report by Berger and colleagues provides some insight into potential reasons for these results. Time in the hospital to first balloon inflation was found to be an important determinant of mortality. In 27% of patients, PTCA did not occur within 90 minutes of arrival at the hospital. Although the relation was not strong between mortality and time from onset of symptoms to PTCA, only 18 patients (3%) had angioplasty within 2 hours of the onset of symptoms. The mortality rate was higher for patients in whom PTCA was done 3 to 4 hours after symptom onset (3.5%) than for those having PTCA within 2 to 3 hours (1.1%). In the substudy, while the confidence intervals were large, a trend toward decreased mortality with tissue plasminogen activator rather than PTCA was seen in the patients who presented within 4 hours of the onset of symptoms (1). Thus, outcome in patients with MI is determined primarily by the time to reperfusion rather than the method used to achieve it.

A counterintuitive finding of the current study is that patients who had PTCA sooner after admission were less critically ill. Mortality was only 1% in patients who had PTCA within 60 minutes, but such patients were more likely to be men, were younger, and had lower heart rates and better Killip class. Although these results may reflect chance, an alternative and clinically important interpretation is that evaluation and management of higher-risk patients often delays the time to treatment. Overall, these results reemphasize that achieving patency of an infarcted artery is the primary treatment objective in patients with acute MI.

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Reference
1. **The Global Use of Strategies to Open Occluded Coronary Arteries in Acute Coronary Syndromes (GUSTO IIb) Angioplasty Substudy Investigators.** N Engl J Med. 1997;336:1621-8.