SCIENTIFIC LETTER

Out of hours percutaneous coronary interventions in acute coronary syndromes: long-term outcome

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Heart 2006;92:1157–1158. doi: 10.1136/hrt.2005.081281

The management of acute coronary syndromes, comprising ST segment elevation myocardial infarction (STEMI) and non-STEMI, is based on prompt restoration of coronary blood flow. Numerous randomised trials have confirmed that mechanical modalities of revascularisation are superior to pharmacological approaches even when transfer to hospital with catheterisation facilities is considered. A similar success rate of percutaneous coronary intervention (PCI) is difficult to achieve during the night and on weekends, however, due to the specific related settings. Experienced interventional team and a well-established hospital logistics are needed 24 h a day to give adequate treatment within a short time. So far, results have been conflicting in the studies on emergency PCI performed during the normal working day compared with out of hours. We therefore carried out a prospective study to specifically investigate this comparison.

METHODS

All consecutive patients with acute coronary syndromes treated by PCI between 1 August 2001 and 31 August 2003 were prospectively allocated to two groups according to the time of the invasive procedure. Patients with STEMI were enrolled if acute chest pain concomitant to ST segment elevation by more than 1 mm in two contiguous leads was confirmed. Patients with non-STEMI were enrolled if they had acute chest pain with ST segment depression by more than 0.5 mm or negative T waves in at least two contiguous leads or a positive cardiac biomarker (troponin I). Patients were then allocated to the out of hours group if they were treated during the night or weekend. The normal hours group comprised patients treated during routine daily working hours (08 00 to 18 00). The study primary end point was cardiovascular death and combined incidence of cardiovascular death, reinfarction, target vessel revascularisation or stroke at 12 months. Survival curves were constructed according to the Kaplan–Meier method and compared by the log rank test. A value of $p \leq 0.05$ was considered significant. The protocol was approved by the local ethics committee.

RESULTS

The study population consisted of 510 patients (mean age 66 (SD 13) years; 24% women) followed up during a mean period of 17 (10) months.

The STEMI population consisted of 284 patients distributed between normal hours (45%, $n = 128$) and out of hours (55%, $n = 156$) groups. Other than higher rates of prior aspirin (97% v 100%, $p = 0.03$) and β blockers use (37% v 24%, $p = 0.023$) in patients treated out of hours, baseline characteristics were similar in both groups. PCI failure rate and mean hospitalisation duration (8.6 days) did not differ statistically between the groups. The delay from symptom onset to first medical contact was 231 (210) min in the normal hours group and 368 (657) min in the out of hours

Figure 1 Kaplan-Meier curve of combined incidence of major adverse cardiac events (MACE) in patients with ST elevation myocardial infarction undergoing percutaneous coronary interventions during the normal working day and out of hours.

group. Door-to-balloon time was 97 (58) min in the out of hours group and 157 (172) min in the normal hours group. Survival rate (93% v 87%, $p = 0.1$) and rate of survival free from major adverse coronary events (MACE) (85% v 80%, $p = 0.20$) did not differ (fig 1).

The non-STEMI population comprised 226 patients mainly treated during normal hours (74%, $n = 168$). Baseline characteristics, prior drug treatment, TIMI (Thrombolysis In Myocardial Infarction) risk score and PCI failure rate were similar in both groups. Duration of hospitalisation was 7 (5) days for the normal hours patients and 5 (5) days if the procedure was done out of hours. The delay from symptom onset to first medical contact was 230 (239) min in the normal hours group and 329 (492) min in the out of hours group of patients. Door-to-balloon time was 145 (125) min in the out of hours group and 251 (276) min in the normal hours group. Patients treated out of hours had a lower survival rate (94% v 85%, $p = 0.03$). The MACE-free survival rate did not differ significantly between the groups (82% v 76%, $p = 0.21$).

DISCUSSION

The present study on long-term outcome of patients with acute coronary syndromes showed a similar incidence of MACE at one year among patients with STEMI whether they were revascularised out of hours or during the normal working day. These data confirm previous investigations. Garot and colleagues¹ described a similar outcome in 288

Abbreviations: CADILLAC, Controlled Abciximab and Device Investigation to Lower Late angioplasty Complications; FRISC II, Fragmin and Fast Revascularization during Instability in Coronary Artery Disease II; MACE, major adverse coronary events; MITRA, Maximal Individual Therapy in Acute Myocardial Infarction; PCI, percutaneous coronary intervention; STEMI, ST segment elevation myocardial infarction; TIMI, Thrombolysis In Myocardial Infarction

patients admitted for acute myocardial infarction whether PCI was done out of hours or during normal working hours. Furthermore, a retrospective analysis of 491 patients from the MITRA (Maximal Individual Therapy in Acute Myocardial Infarction) study reported no in-hospital mortality difference between patients treated from 20 00 to 08 00 and from 08 00 to 20 00 (8.7% *v* 5.3%, $p = 0.238$).² These data had limited clinical impact due to the short-term outcome considered. Only one long-term study analysed PCI done out of hours compared with normal working hours. Beohar and colleagues³ followed up 220 consecutive patients undergoing primary PCI for acute myocardial infarction during a mean of 20 months. No significant difference in MACE incidence was noted according to the time of intervention. Sadeghi and colleagues⁴ evaluated the impact of out of hours management among 2036 patients from the CADILLAC (Controlled Abciximab and Device Investigation to Lower Late angioplasty Complications) trial. Despite an increased delay during out of hours, one-year mortality was similar to that of patients treated during the normal working day. In contrast, two publications described worse outcome after treatment out of hours. Saleem and colleagues⁵ reported a higher incidence of in-hospital death among 1050 patients presenting out of hours (19 00 to 07 00) (5.8% *v* 3.2%, $p < 0.05$). Henriques and colleagues⁶ published a post hoc analysis of 1702 patients with STEMI treated by primary PCI. They found a higher incidence of death at 30 days among the population treated out of hours, strongly linked with failure of successful reperfusion. We did not make this observation in our investigation.

Since publication of the FRISC II (Fragmin and Fast Revascularization during Instability in Coronary Artery Disease II) study, several reports have confirmed the benefit of the systematic invasive approach for patients with non-STEMI. Concurrently, the delay between symptom onset and PCI became shorter. This implied that patients with non-STEMI should be considered for coronary revascularisation out of hours. Our data do not support this strategy due to the worse clinical outcome of this subgroup of patients when revascularised at night or during the weekend. This may be due to the benefit of earlier intervention among patients presenting during normal hours patients in our study, but may also be due to other factors that we have not analysed in

the present study such as the impact of reduced logistics in emergency rooms and intensive care units out of hours. Reasons for the lower survival among patients with non-STEMI patients can therefore potentially be missed, as our analysis focused on revascularisation results.

Our data confirm that the benefit of early mechanical revascularisation among patients with STEMI, as shown in previous studies of procedures done during normal working hours, is maintained out of hours when optimal logistics are lacking. This conclusion cannot be reached with respect to patients with non-STEMI.

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Accepted 22 December 2005

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