Original research article – Special issue: Acute Coronary Syndromes

The magnitude of percutaneous coronary intervention treatment in high and medium risk non-ST elevation acute coronary syndrome

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intervention
Received
Available
Acute
Keywords: Accepted
Received

0010-8650/
http://dx.doi.org/10.1016/j.crvasa.2014.04.002
Article

A R T I C L E   I N F O
Article history:
Received 27 February 2014
Received in revised form 6 April 2014
Accepted 8 April 2014
Available online 9 May 2014

A B S T R A C T
Introduction: Current ESC guideline supported invasive treatment of non-ST elevation acute coronary syndrome (NSTE-ACS) is guided by GRACE risk model.
Objective: The aim of this study was to determine whether the percutaneous coronary intervention treatment in (NSTE-ACS) ameliorates the long-term mortality assessed by GRACE risk score.
Methods: We conducted a retrospective study of a consecutive sample of 680 patients with (NSTE-ACS) treated by PCI in Heart Center of Semmelweis University. The GRACE risk score was calculated for each patient at admission. The mean of relative risk in each group was assessed and compared with the long-term clinical outcomes (observed 6-month mortality).
Results: The mean of calculated GRACE amounts to 1.6% for low risk patients, 5.0% for medium risk patients, and 21.3% for patients with high risk. In contrast, the observed risk of 6-month death was 0.42% for low risk patients, 1.1% for medium risk patients, and 12.6% for patients with high risk. The difference between assessed and observed 6-month mortality in high risk and medium risk groups was significant (medium risk \(p = 0.004\); high risk \(p = 0.0097\)). Observed risk of death in low risk patients was also lower, but not significant than assessed risk.
Conclusion: The risk of death in patients with NSTE-ACS treated in a high volume center is significantly lower than predicted by the GRACE risk model. Our results suggest that percutaneous coronary intervention treatment guided by the GRACE risk model in medium and high risk patients with (NSTE-ACS) provides the greatest clinical benefit.

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http://dx.doi.org/10.1016/j.crvasa.2014.04.002
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Introduction

At least 70% of acute coronary patients are classified as those with either unstable angina or non-ST segment elevation myocardial infarction (NSTE-ACS) [1,2]. Despite secondary prevention including pharmacological treatment [3] and optimal cardiac rehabilitation [4], the long-term outcomes of patients with unstable angina or NSTEMI are equal or worse [5–9] than the outcomes in ST-segment elevation myocardial infarction [10]. These consequences are a result of by increased age and are further evidence of comorbidity such as diabetes mellitus, chronic kidney disease, previous myocardial infarction, coronary artery bypass graft surgery or advanced coronary disease. Consequently the risk stratification plays a key role in the management of NSTE-ACS [11–19]. The Global Registry of Acute Coronary Events (GRACE) risk model enables professionals to assess the risk of death and it also provides a guide to the invasive therapy [11,20–26].

The aim of the study was to determine whether the percutaneous coronary intervention treatment in NSTE-ACS could improve the long-term mortality according to the estimated GRACE risk score.

Methods

Study population

The study population included 690 consecutive patients with NSTE-ACS treated by PCI in the Heart Center of Semmelweis University, Budapest, Hungary. Eligible patients were at least 18 years old and were admitted to the hospital with a presumptive NSTE-ACS which was verified. Each one of them was treated with percutaneous coronary intervention.

Patient stratification

The cohort of the present study (n = 690) was stratified on the basis of predefined cut-off points of the GRACE risk score into low, medium and high risk groups. The GRACE risk model is composed of the following predictor variables on presentation: age, heart rate, systolic blood pressure, cardiac arrest, Killip class, creatinine, ST segment deviation and biomarker status [27]. Points are scored according to the set variables for each element, and the sum of the points equates to the GRACE risk score. All of the risk groups were divided into further subgroups by age: under 65 years, between 65 and 75 years, and above 75 years.

Statistics

Comparison of the predictor variables between the international GRACE patient population and the patients treated in the Semmelweis University Heart Center was made by $\chi^2$ test. The mean of the individual GRACE risk scores was calculated in each risk group. $\chi^2$ test was used for comparison of assessed and observed risks of death. All calculations were done with Excel 2009 (Microsoft Inc., Seattle, USA).

| Table 1 – Baseline clinical characteristics of patients in Heart Center of Semmelweis University (HC-SE) and GRACE NSTE-ACS study (GRACE). |
|---------------------------------|-----------------|-----------------|
| Patient characteristics         | HC-SE (n = 690) | GRACE (n = 23,825) |
| Age (years)                     | 67              | 67              |
| Male (%)                        | 69              | 65              |
| Hypertension (%)                | 82%             | 64%             |
| Hypercholesterolemia (%)        | 48%             | 51%             |
| Diabetes mellitus (%)           | 34%             | 27%             |
| Myocardial infarction (%)       | 51%             | 37%             |
| Percutaneous coronary intervention (%) | 22%         | 20%             |
| Coronary artery bypass graft (%)| 12%             | 17%             |

Values are n (%). HC-SE, Heart Center Semmelweis University, GRACE, Global Registry of Acute Coronary Events. * $p < 0.05$.

Results

Baseline clinical characteristics of 690 patients with NSTE-ACS treated with PCI in the Heart Center of Semmelweis University were compared to the characteristics of the population of GRACE NSTE-ACS registry in Table 1. Patients of our study population were more likely to have a history of hypertension, diabetes mellitus and previous myocardial infarction.

According to the calculated GRACE risk score, 184 patients were assigned to the group with high risk, 266 patients to the group with medium risk and 251 patients to the group with low risk. A total of 27 patients died within 6 months after PCI, 22 of them showed high risk, 3 medium and only 1 patient was in the low risk group. The observed relative risk of 6-month mortality amounts to 12.6% for high risk, 1.1% for medium risk, and 0.4% for low risk patients.

The difference between assessed and observed 6-month mortality in the high risk group was statistically significant ($p = 0.03$). Observed mortality in the low and medium risk group was not significant, but it shows a downward tendency. The patients between aged 65 and 75 years belonging to the medium risk subgroup and patients aged above 75 years belonging to the high risk subgroup had significantly lower observed mortality than assessed risk of death (Fig. 1).

Discussion

The results of the present study show that the risk of death in patients with NSTE-ACS treated with PCI in a high volume center was significantly lower than predicted by the GRACE risk model. After PCI the observed mortality decreased in each risk group and subgroup compared to the assessed risk of death by GRACE score, significantly in patients with high risk (12.6% compared to 21.3%) and in patients between aged 65 and 75 years belonging to the medium subgroup (0.7% compared to 5.04%). The observed mortality in patients belonging to the medium risk group (1.1%) reached the level of the low risk group assessed by the GRACE risk model (1.6%). In point of mortality, patients in the medium risk group treated with PCI have fallen into the group with low risk. While our
study population was more likely to have comorbidity (such as hypertension, diabetes mellitus or previous myocardial infarction) than the population studied in GRACE trial, after all the observed risk of death was lower.

Our results suggest that percutaneous coronary intervention treatment guided by expert cardiologists in a high volume interventional center provides the greatest clinical benefit in medium and high risk patients with NSTE-ACS assessed by the GRACE risk model.

**Conflict of interest**

There is no known conflict of interest.

**Funding body**

There was no financial support for the conduct of the research and/or preparation of the article.

**Ethical statement**

This research was done according to the ethical standards.

**Acknowledgement**

Agnes Becker (data collection), Peter Vargha (statistics).

**REFERENCES**


