Original article

Short- and long-term mortality in patients with ST-elevation myocardial infarction treated with different therapeutic strategies. Results from WIelkopolska REgional 2002 Registry (WIRE Registry)

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Abstract

Backround: Although primary coronary angioplasty seems to be the best treatment in acute myocardial infarction (MI), thrombolytic therapy still remains the most common reperfusion strategy particularly in smaller centers. Nowadays, different regional networks are developed to improve the treatment of patients with MI.

Aim: To analyse the effects of different therapeutic strategies on 30-day and long-term mortality (median time 18.3 months) after ST-elevation MI (STEMI) in a population of 3 350 000 people from the Wielkopolska Region.

Methods: In 2002, 3780 patients with STEMI entered the registry. Complete data were available for 3564 (94.3%) patients. Depending on therapeutic strategies, patients were divided into five groups: the PCI group – direct percutaneous coronary angioplasty (PCI) in small cathlab, 'selected patients', n=381 (10.7%); the PA group – aged <70, treated with tissue plasminogen activator (rt-PA) up to 4 hours from the onset of chest pain, n=479 (13.4%); the IS group – invasive strategy in every patient, 24-hour duty, setting of unselected patients with STEMI, n=989 (27.7%); the SK group – patients receiving standard streptokinase treatment up to 12 hours from the onset of chest pain, n=584 (16.4%); the NR group – no reperfusion therapy, n=1131 (31.7%).

Results: The 30-day mortality rate in the groups above was: 3.15, 4.38, 4.54, 9.25, and 12.5% respectively (p <0.001). Long-term mortality rate was: 4.2, 9.4, 9.4, 14.4, and 18.50% respectively (p <0.001). The rate of urgent PCI in the PA group was 25% and in the SK group – 11% (p <0.001).

Conclusions: Treatment with rt-PA in patients under 70 years of age and up to 4 hours from pain onset may be an alternative to an invasive strategy. However, a quarter of those patients require urgent PCI. In long-term observation the mortality benefit can be clearly seen only in patients with early PCI.

Key words: myocardial infarction mortality, thrombolysis, primary angioplasty

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Introduction

Recent studies have shown that the treatment of ST-elevation myocardial infarction (STEMI) with primary percutaneous coronary angioplasty (PCI) decreased mortality and the incidence of major adverse cardiovascular events as compared with thrombolytic therapy [1, 2]. However, a delay of 60 minutes or more in PCI treatment may cause a loss of mortality benefit [3, 4]. Moreover, early prehospital thrombolysis may result in a similar or even greater reduction in mortality as compared with primary PCI [5, 6]. Today both methods are recommended in the treatment of patients with acute STEMI. In the 'real world' however, the choice of treatment is determined not only by the duration of ischaemia, but also by the availability of experienced catheterisation laboratories and by economic considerations as well.

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We sough to analyse the influence of regional STEMI treatment differences on short- (30-day) and long-term (16-24 month) mortality in patients with STEMI treated with streptokinase, tissue plasminogen activator (rt-PA) or primary PCI, as well as those not reperfused, in the Province of Wielkopolska in 2002.

Methods

In 2002 a treatment programme of STEMI was developed and introduced in the Wielkopolska Region with an area of 29 825 km^2 and with a population of approximately 3 350 000 inhabitants (Figure 1). The city of Poznan (860 thousand inhabitants) was serviced by 11 cardiological units with two invasive centres in public hospitals, whereas in the rest of the region there were 32 local cardiac units in general hospitals situated in the cities with a population of 25-108 thousand, and one cath lab in the city of Kalisz – Figure 1.

During the introduction of this regional programme the following had to be taken into consideration: the small number of catheterisation laboratories in the Wielkopolska Region, which excluded the universal use of primary PCI in all patients with STEMI; high costs of rt-PA, which limited the possibility of the wide use of the drug; possibility of rescue PCI for all subjects to be treated with thrombolytics (approximately 2 400 000 patients) without symptoms of reperfusion (transfer to Poznań).

All consecutive patients presenting within 24 hours from the symptom onset were included in the registry. The inclusion criteria were as follows: (1) typical chest pain lasting >30 minutes, (2) ST-segment elevation ≥0.1 mV or ≥0.2 mV in leads V_1-V_3 (at least two adjacent) and/or new pathological Q waves (≥0.03 seconds), (3) elevated serum markers of myocardial necrosis: creatine kinase-MB isoenzyme (CK-MB) or troponin concentrations.

Depending on the treatment strategy the patients were divided into the following groups.

Group IS (invasive strategy)

This group consisted of all consecutive patients with STEMI in the city of Poznań admitted within 12 hours from symptom onset. The patients were transferred by emergency ambulances from their homes directly to an invasive centre on duty, or they were referred from the ten remaining hospitals in Poznań. Patients presenting more than 12 hours from the symptom onset, without pain on admission and without the dynamic changes in ECG, were treated conservatively (no fibrinolysis).

Groups PA (patients treated with rt-PA), SK (streptokinase) and NR (no reperfusion)

According to our regional recommendations in 32 tertiary hospitals of Wielkopolska the patients with STEMI underwent fibrinolytic therapy within 12 hours from pain onset. In 17 hospitals patients were treated with streptokinase (**group SK**).

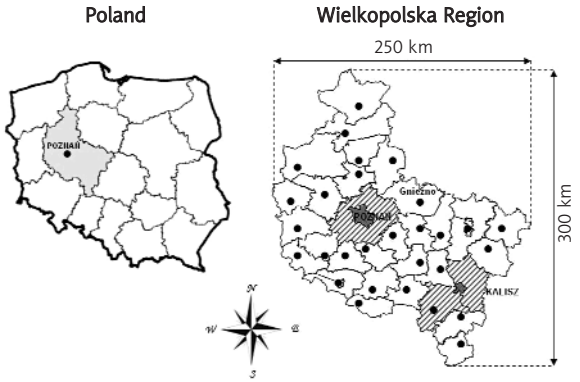

Figure 1. Map of Poland and the Wielkopolska Region

In 15 remote hospitals rt-PA was available (**group PA**). For economic and safety reasons, as well as to maximise the effect of treatment, the use of rt-PA was recommended if the following criteria were fulfilled: (1) the time from the onset of chest pain to presentation was ≤4 hours, and (2) the patient's age was ≤70. The use of this drug was left at the discretion of doctors of each local hospital; remaining patients received streptokinase.

Thrombolytic therapy was not used mainly in patients who were admitted after 12 hours from the onset of chest pain, in those with contraindications and for undefined reasons in some cases (**group NR**).

Group PCI (primary angioplasty)

A distinct subgroup of patients was transported to the invasive centre in Kalisz in the south of the region. At that time, the centre was performing approximately 500 interventions per year. The hospital did not have its own cardio-thoracic surgery department, and in case of complications patients were transported to Poznan. Because of insufficient experience of the centre, only low- and moderate-risk patients (age <80, no cardiogenic shock) were admitted to the catheterisation laboratory within the first 6 hours from symptom onset. At the beginning, the procedures were performed only during working hours. The patients presenting between 6 to 12 hours from the onset of chest pain were treated with streptokinase.

Data collection and statistical analysis

Clinical data were obtained from a survey specifically designed for the purposes of the programme, which was completed by physicians in the participating centres. The information concerning hospitalisation covered the period from 1 January 2002 to 31 December 2002. The information about patients' condition following discharge was collected until 31 December 2003. The information in question was passed on by general practitioners to the

Table I. Baseline characteristics according to type of reperfusion therapy

Variable	IS group (n=989) primary PCI (12 hours) 'non-selected patients'	PA group (n=479) rt-PA (4 hours)	SK group (n=584) streptokinase (12 hours)	NR group (n=1131) no-reperfusion therapy	PCI group (n=381) primary PCI (6 hours) 'selected patients'	p value
Age [years]	59.1±11.6	56.1±10,4	65.6±11.8	68.2±12.1	61.9±11.4	<0.0001 a, b, c, e, f, g, h, i, j
Male gender	665 (69.1%)	382 (79.7%)	376 (67.2%)	664 (60.5%)	256 (67.2%)	<0.0001 b, c, e, f, g <0.0003 d
Risk Factor						
Hypertension	475 (48.0%)	177 (36.9%)	252 (43.1%)	576 (50.1%)	188 (49.3%)	<0.0001 a, g <0.0026 <0.003 f
Diabetes mellitus	189 (19.1%)	80 (16.7%)	138 (23.6%)	307 (27.1%)	76 (19.9%)	<0.001 c, f
Overwight (BMI>25)	295 (20.7%)	74 (15.4%)	118 (20.2%)	217 (19.2%)	78 (20.5%)	>0.05
Hipercholesterolaemia	232 (23.4%)	140 (29.2%)	155 (26.5%)	263 (23.2%)	81 (21.2%)	>0.05
Current or past smoking	516 (52.2%)	253 (52.8%)	250 (42.8%)	453 (40.1%)	125 (54.8%)	<0.0001 c, d, f, g <0.0004 b <0.0019 i <0.0013 e
Previous history						
Myocardial infarction	239 (24.2%)	64 (13.4%)	62 (10.6%)	55 (14.4%)	55 (14.4%)	<0.0001 a, b, c, d
Angina	229 (23.1%)	87 (18.2%)	126 (21.6%)	63 (16.5%)	63 (16.5%)	<0.0001 c, e, h, j
PTCA	48 (4.6%)	15 (3.1%)	2 (0.3%)	8 (2.1%)	8 (2.1%)	<0.001 a, b, c, i
CABG	8 (0.8%)	0	1 (0.2%)	5 (1.3%)	5 (1.3%)	<0.0012 e

a: group IS vs. PA *c: group IS vs. NR* *e: group PA vs. SK* *g: group PA vs. PCI* *i: group SK vs. PCI*
b: group IS vs. SK *d: group IS vs. PCI* *f: group PA vs. NR* *h: group SK vs. NR* *j: group NR vs. PCI*

Abbreviations: BMI – body mass index, PTCA – percunateous transluminal coronary angioplasty, CABG – coronary artery bypass graft

cardiology departments. Data concerning deaths were verified in the Regional Statistical Office. All information was sent to the coordinating centre, where statistical analysis was performed.

Continuous variables are presented as mean ± SD. Measurements were compared by one-way analysis of variance and significant differences between groups were sought by means Tukey multiple range test. Categorical variables were presented as the number and percentage of observed events and χ^2 analysis was used for comparisons of proportions. Odds ratio with 95% confidence interval (CI) as a measure of an event occurring was calculated. Each group of values was compared with all the others using Bonferroni correction for multiple comparisons. The Kaplan-Meier curves were plotted to summarise follow-up and compared using the log-rank test. The variables that were statistically significant in the univariate analysis were included in the multivariate analysis. A Cox proportional hazard model was chosen for assessing the impact of several risk factors on survival. A p value <0.05 was considered statistically significant.

Results

Study population

In 2002, in the Wielkopolska Region, 3780 patients with acute STEMI entered the registry. Complete data were available for 3564 (94.3%) patients. The following numbers of patients were assigned to each of the groups: IS – 989 (27.7%); PA – 479 (13.4%); SK – 584 (16.4%); PCI – 381 (10.7%); and NR – 1131 (31.7%). In 437 patients of the PA group the drug was administered within the first 4 hours of STEMI (92%), and in the remaining 42 (8%) patients between 4 and 6 hours. In 304 patients of the SK group (52%), the drug was administered within the first 4 hours of STEMI, in 127 (22%) patients between 4 and 6 hours, and in 149 (26%) patients between 6 and 12 hours. In 2002, in Wielkopolska, a total of 2433 (68.3%) patients received reperfusion therapy. In 1131 (31.7%) patients, reperfusion therapy was not used. In the majority of them (622 patients – 55%) the reason was late admission, more than 12 hours from the onset of chest pain. In 171 (15.1%) patients contraindications to fibrinolytic

Table II. In hospital Killip class, stroke, ECG myocardial infarction localisation and discharge medication

Variable	IS group (n=989) primary PCI (12 hours) 'non-selected patients'	PA group (n=479) rt-PA (4 hours)	SK group (n=584) streptokinase (12 hours)	NR group (n=1131) no-reperfusion therapy	PCI group (n=381) primary PCI (6 hours) 'selected patients'	p value*
Killip class						
I	728 (73.6%)	373 (77.8%)	482 (72.7%)	839 (74.2%)	301 (79.0%)	>0.05
II	135 (13.7%)	70 (14.6%)	102 (17.5%)	156 (13.8%)	53 (14.0%)	>0.05
III	75 (7.6%)	13 (2.7%)	30 (5.1%)	69 (6.1%)	20 (5.2%)	only IS vs. PA p <0.0005
IV	51 (5.2%)	23 (4.8%)	27 (4.6%)	67 (5.9%)	7 (1.8%)	only NR vs. PCI p <0.0009
Stroke	5 (0.56%)	6 (1.25%)	6 (1.03%)	18 (1.59%)	1 (0.2%)	>0.05
ECG localisation						
Anterior	422 (42.6%)	225 (46.9%)	210 (35.9%)	466 (41.2%)	111 (29.1%)	**<0.0001 c, f, h, j <0.0039 g <0.0022 e
Posterior	428 (43.2%)	231 (48.2%)	320 (54.7%)	410 (36.2%)	161 (42.3%)	
Other	93 (9.4%)	13 (2.7%)	24 (4.1%)	197 (17.4%)	88 (23.0%)	
Undetermined	46 (4.6%)	10 (2.1%)	30 (5.1%)	58 (5.1%)	21 (5.50%)	
Discharge medication						
Antipatelet agents	989 (100%)	450 (94.0%)	561 (96.0%)	1046 (92.5%)	381 (100%)	*** <0.001
Beta-blockers	627 (70.5%)	339 (70.8%)	442 (75.6%)	907 (80.2%)	305 (80.0%)	*** <0.001
ACE inhibitors	445 (50.0%)	290 (60.5%)	363 (62.2%)	735 (65.0%)	242 (63.4%)	*** <0.001
Statins	825 (92.8%)	460 (96.0%)	554 (94.8%)	1024 (90.5%)	336 (96.0%)	*** <0.001

** Bonferroni correction for multiple comparisons*
*** anterior localisation vs. posterior + other + undetermined localisation*
**** χ^2 test*
Abbreviations: see Table I.

therapy were found, and in the remaining 338 (29.9%) patients the reason is not known.

Baseline clinical characteristics and risk factors are given in Table I. Infarct localisation, haemodynamic status (Killip class) and discharge medication are shown in Table II.

30-day mortality

Overall mortality during the 30 days of observation was 8.0% (286/3564). In patients treated with reperfusion therapy, mortality was 5.9% (144/2433), whereas in non-reperfusion patients it was 12.53% (142/1131) (p <0.001). Thirty-day mortality rates within the four different strategies of reperfusion are presented in Figure 2a. Mortality rates were as follows: group IS 4.54% (45/989), PA 4.38% (21/479), SK 9.25% (54/584), NR 12.5% (142/1131), and group PCI 3.15% (12/381). Mortality was significantly lower in groups IS, PA and PCI, compared with SK and NR groups (p <0.001). There was also a significant difference between SK and NR groups (p <0.038, OR 0.70, 95% CI 0.51-0.98). Despite the difference in clinical characteristics (Table I) of both invasive groups, only minor, non-significant differences were found between them (30-day mortality 3.15% in group PCI vs. 4.54% in group IS). Relevant Kaplan-Meier curves are shown in Figure 3. The pattern of the curves for groups IS, PA and PCI was very similar, but it differed significantly from the pattern of curves for SK and NR groups. Figure 4 shows the calculated values of OR (95% CI) in order to compare mortality reduction in the PA group with the remaining groups. The reduction in the PA group did not differ significantly from both invasive arms. Distinct and statistically important differences in mortality were observed between the PA and SK group on one hand (p <0.0024) and between the PA and the NR group on the other hand (p <0.0001). In the subgroup of patients treated with streptokinase up to 4 hours, mortality was 7.2% (22/304). This difference was not significant (p=0.146) in comparison with 4.38% in the PA group. Urgent PCI (up to 7 days after acute MI) was performed in 124/476 (26.0%) patients in the PA group and in 57/579 (10.0%) patients treated with streptokinase (p <0.001).

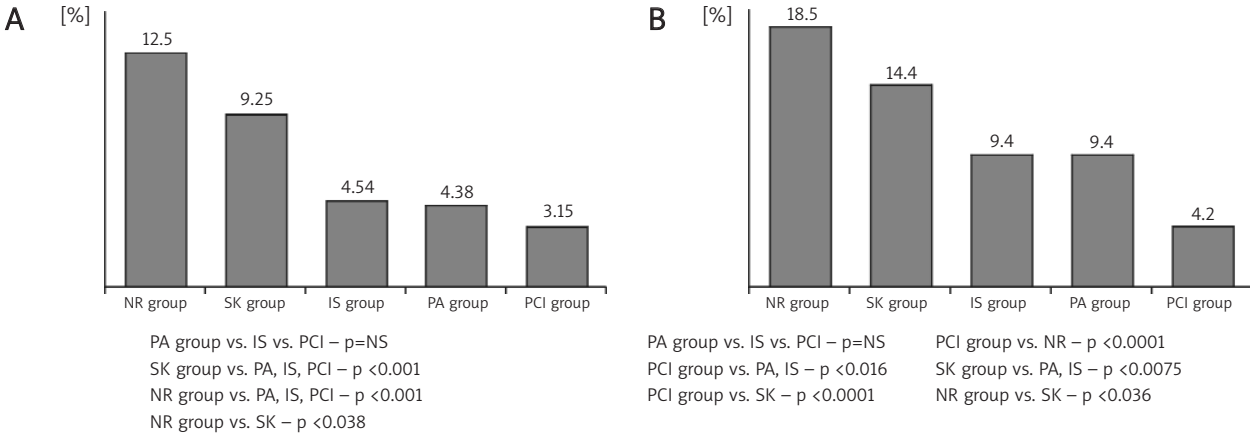

Figure 2. Thirty-day (**A**) and long-term (**B**) mortality rate (median time – 18.3 months) in patients treated with different therapy strategies

Abbreviations: IS group – invasive strategy up to 12 hours, non-selected patients; PA group – patients treated with rt-PA up to 4 hours, aged under 70; SK group – patients treated with streptokinase up to 12 hours; NR group – non-reperfusion therapy patients; PCI group – primary PCI up to 6 hours, selected patients

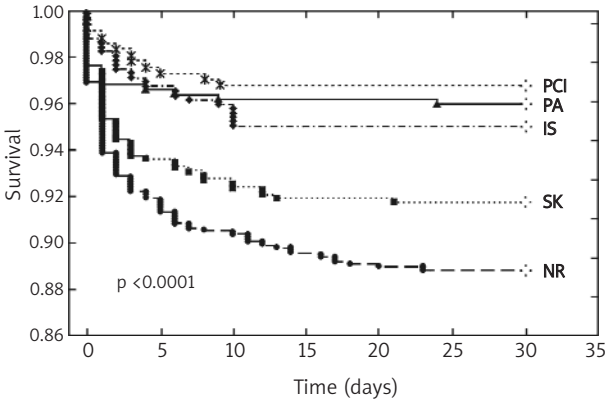

Figure 3. Kaplan-Meier 30-day mortality curve, according to different therapeutic strategies

Abbreviations: see Figure 2

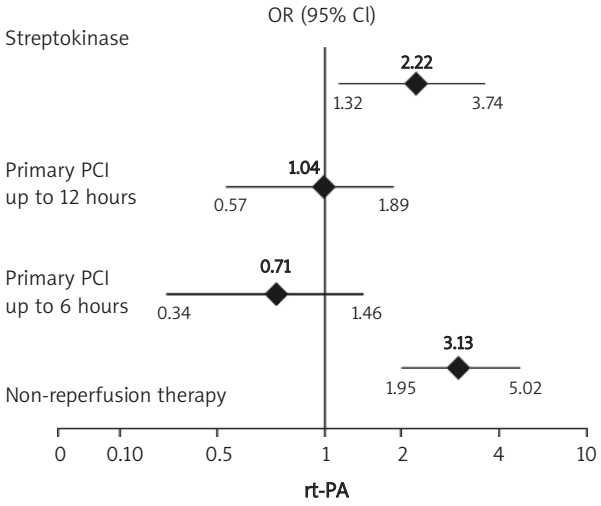

Figure 4. Calculated 30-day mortality OR (95% CI) for different groups in comparison with rt-PA treated group (OR=1)

Long-term mortality

The median time of the observation period was 18.3 months (14.2–22.0). Long-term mortality rates (Figure 2b) were as follows: IS group – 9.4% (93/989), PA group – 9.4% (45/479), SK group – 14.4% (84/584) and NR group – 18.5% (209/1131). The lowest mortality rate was observed in group PCI – 4.2% (16/381), which differed significantly from all other groups (p <0.01 – p <0.0001). Mortality rates in groups IS and PA were considerably lower than in groups SK (p <0.0075) and NR (p <0.0001). The difference between the SK and NR groups was also significant – OR 0.74, 95% CI 0.56–0.98, p <0.036 (Figure 2b). Relevant Kaplan-Meier curves are presented in Figure 5. Long-term mortality rate in the PCI group was substantially lower than in the remaining groups (p <0.0001). Calculated ORs (95% CI) comparing patients treated with rt-PA with all other groups are presented in Figure 6. The mortality rate

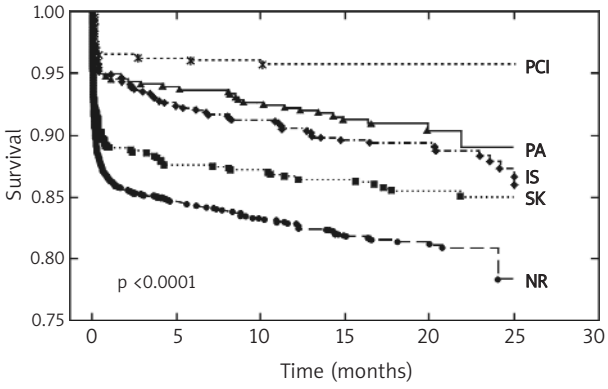

Figure 5. Kaplan-Meier long-term mortality curve (median time – 18.3 months) according to different therapeutic strategies

Abbreviations: see Figure 2

in group PCI was significantly lower than in groups PA and IS (p <0.0003), which in turn did not differ between each other. Mortality rate in the PA group was also significantly lower than in both the SK (p <0.014), and the NR (p <0.0001) groups.

Cox multivariate regression analysis

In a Cox multivariate regression analysis all variables presented in Tables I and II were included. Data presented in Tables III and IV contain only variables that significantly correlated with mortality. Thirty-day mortality was most affected by the age of patients and their haemodynamic status (Killip class 3 and 4), as well as anterior location of acute STEMI (Table III). The risk of death was significantly lower in both invasive strategies (the PCI and the IS groups) and rt-PA treated patients (the PA group). Treatment with streptokinase did not show any significant effect on mortality (p <0.316). A similar analysis for late mortality is shown in Table IV. Similarly, age, haemodynamic status and anterior location of STEMI showed a strong and significant influence on mortality. Only in the PCI group significant effects of treatment on late mortality were demonstrated (p <0.0001). In the PA group this influence was of borderline significance (p <0.054), whereas in groups IS and SK the treatment method was not found to have any significant influence on late mortality.

Discussion

Reperfusion therapy and overall mortality

The proportion of patients treated with reperfusion therapy in the presented study (WIRE registry) is greater than in other surveys, such as: GRACE – 62% [7, 8] and ENACT – 59% [9] in 1999, and Euro Heart Survey ACS – 56% [10] in 2000. The proportion of patients treated with primary PCI was comparatively greater than in the other studies: 56 vs. 40, 8, and 21% respectively. These studies represent international registries and differences between individual countries were significant. In comparison with all these studies, the WIRE registry contains the highest proportion of patients with STEMI treated with reperfusion, and with primary PCI. Despite this advantage, overall mortality within 30 days made up 8% and was slightly greater than in the ENACT study (in-hospital) – 6% [9], and GRACE (in-hospital) – 7% [8], but lower than in the French registry (in-hospital) – 9.3% [11] and in the Euro Heart Survey (30-day) – 11% [10]. In patients not treated with reperfusion, mortality rates are also similar among the studies. In our study, 30-day mortality rates in treated and non-treated groups were 5.9 vs. 12.5%, whereas in the GRACE study they were 5.0 vs. 10.0% [7], and in the French registry 6.5 vs. 12.1% [11]. The overall 30-day mortality of STEMI patients in the population of Wielkopolska is similar to that observed in other European countries, and similarly to the quoted studies is significantly lower in patients treated with reperfusion therapy.

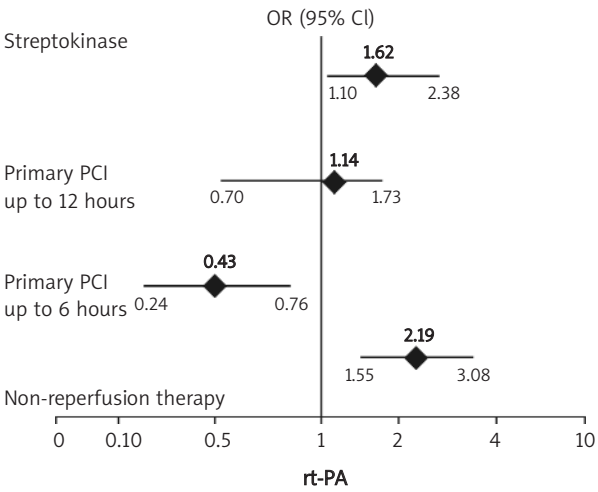

Figure 6. Calculated long-term (median time – 18.3 months) mortality OR (95% CI) for different groups in comparison with rt-PA treated group (OR=1)

Table III. Multivariable predictors of 30-day mortality

Variable	HR	95% CI	p value
Age	1.02	1.01-1.03	0.00001
Killip class III	2.22	1.64-3.01	0.00001
Killip class IV	8.50	6.57-11.0	0.00001
Smoking	0.56	0.44-0.72	0.00001
Primary PCI up to 12 hours	0.50	0.36-0.72	0.0001
Anterior infarction	1.39	1.10-1.77	0.005
Previous angina	1.28	1.02-1.63	0.03
rt-PA	0.60	0.38-0.96	0.03
Primary PCI up to 6 hours	0.53	0.29-0.97	0.03

Table IV. Multivariable predictors of long-term mortality

Variable	HR	95% C I	p value
Age	1.03	1.02-1.04	0.00001
Killip class III	2.10	1.68-2.80	0.00001
Killip class IV	6.80	5.37-8.63	0.00001
Primary PCI up to 6 hours	0.35	0.21-0.60	0.00001
Anterior infarction	1.37	1.12-1.68	0.002
Previous angina	1.30	1.06-1.60	0.01
rt-PA	0.71	0.51-1.01	0.054

Short-term mortality

The effectiveness of fibrinolytic treatment inversely correlates with time from the onset of chest pain to the beginning of therapy [12]. In the GUSTO study 30-day mortality rate was 5.5% in patients treated up to 4 hours

from the symptom onset, and 9.0% in patients treated later [13]. Considering the high cost of rt-PA, we aimed to maximise the efficacy of this treatment by recommending its administration within 4 hours from the onset of chest pain. Additionally, to reduce the risk of intracranial haemorrhage, we recommended the use of this treatment in patients <70 years of age [14]. The results in this 'selected' group, in comparison with patients treated with streptokinase (according to the classic indications) appeared to be surprisingly good. These superior results did not differ significantly from those obtained in patients treated with primary PCI within 6 hours from the onset of chest pain (3.15%), or the invasive strategy for unselected population treated up to 12 hours in Poznan (4.54%).

Many aspects, such as age, gender, risk factors, infarct location and haemodynamic status, may have affected the final results of this observational study. In the multivariate regression analysis, two treatment strategies – rt-PA given up to the fourth hour from the onset of pain, and invasive treatment – had a significant impact on 30-day mortality. In the regression analysis, the impact of treatment with streptokinase on mortality was not significant. Irrespectively of younger age of patients it seems that the shorter time-to-treatment with rt-PA (up to 4 hours) than with streptokinase (up to 12 hour) had a definite impact on the obtained results. Nevertheless, the 30-day mortality rate in the subgroup of patients treated with streptokinase up to 4 hours from the onset of pain tended to be higher than in the rt-PA group (7.2 vs. 4.38%), although the difference did not reach statistical significance.

Thirty-day mortality rates in the rt-PA group (4.38%) are similar to those reported in the CAPTIM study: overall 3.8% (time to treatment – 130 min), 2.2% for patients treated with rt-PA within 2 hours, and 5.9% for those treated after 2 hours [5, 6]. Our results are also similar to those obtained in the French registry. In-hospital mortality for prehospital thrombolysis (rt-PA) was 3.3% (median time from symptom onset to hospital admission was 3.6 hours), 8% for in-hospital lysis (median time – 3.5 hours), and 6.7% for PCI (median time 3.2 hours) [11].

Our study also confirmed the recommendation [15] for the use of thrombolytics in patients presenting less than 3 hours from symptom onset. We found no significant differences in 30-day mortality between patients treated with rt-PA within the first 4 hours from symptom onset and the patients treated with primary PCI. However, 25% of patients in the PA group required urgent PCI within the following week. Our results are consistent with data presented in the Second National Registry of Myocardial Infarction (NRMI-2). In this report, 76.5% of the rt-PA patients were treated up to 4 hours from symptom onset, and in the PCI group 56.9% were treated within the same time limit. In-hospital mortality in lytic-eligible patients who had no cardiogenic shock was 5.4% in patients treated with rt-PA and 5.2% in those treated with primary PCI [16].

In our report patients treated with primary angioplasty represent two different groups. The 3.5% mortality rate in patients treated with PCI in Kalisz (the PCI group) is extremely low. Several factors may explain such a good result. This low-volume centre admitted patients with STEMI only within the first 6 hours from symptom onset, and generally did not treat patients in cardiogenic shock, those aged over 80, and the severely ill. Those patients were often transferred to more experienced centres in Poznań. In comparison with patients treated in Poznań (group IS), those in group PCI less frequently had a history of myocardial infarction, angina pectoris, and previous PCI (Table I). Cardiogenic shock and anterior myocardial infarction were also less frequent in this group (Table II). Thus, it was a group of selected, low risk patients. Despite higher mortality risk in patients in the invasive group in Poznań, the 30-day mortality rate was only slightly higher in this population: 4.54 vs. 3.15% (NS). This insignificant difference may be a consequence of better therapeutic effects obtained by more experienced, high-volume centres. It seems that universally accepted risk factors, such as infarct location and haemodynamic status, influenced more long-term outcomes, having only a minor effect on in-hospital mortality in those high--volume centres.

Long-term mortality

Late mortality was the highest in patients not treated with reperfusion therapy and significantly lower in those treated with streptokinase and rt-PA. Late mortality in patients treated within the first four hours with rt-PA was identical to that of the unselected group of patients treated with primary PCI (group IS) up to 12 hours from pain onset – 9.4%. Our findings are analogous to those of the French registry (USIC 2000). In this study, one-year mortality rates after rt-PA given in hospital, after treatment with primary PCI and in the non-treated group were 11 vs. 11 vs. 21% respectively [11]. In our study, the early treatment in younger patients with rt-PA correlated with a better long--term outcome than treatment with streptokinase (Figures 2b and 5). It is not a surprise that primary PCI performed up to the 12th hour from pain onset (group IS) was found not to have any advantage over treatment with rt-PA (Figures 2b, 5 and 6). Although the frequency of cardiogenic shock and anterior location of infarction was similar in both groups, the majority of other risk factors (e.g. age, ischaemia duration) did indeed occur more often in the IS group. In addition, urgent PCI was performed in one quarter of patients treated with rt-PA within 7 days from admission.

In patients with multiple risk factors, the quality of the ambulatory care significantly influences late mortality. Data regarding discharge medications are presented in Table II. Unfortunately, we do not have complete data on the follow--up medication. In the regression analysis typical factors such as age, haemodynamic status (Killip class III and IV),

and infarct location significantly influenced the incidence of late mortality. Surprisingly, treatment with streptokinase, rt-PA or invasive strategy in unselected patients did not demonstrate any significant impact (Table IV). This may be explained by the influence of the extremely low mortality rate observed in a low risk cohort treated with primary PCI in Kalisz (the PCI group) (4.2%), significantly lower than in other groups. Patients in this group less frequently had anterior localisation of STEMI and hardly ever were in shock. Additionally, the significant difference in long-term mortality between both 'invasive' groups was affected by the different ischaemic time (pain-to-balloon time): up to 12 hours in the IS group vs. up to 6 hours in the PCI group. De Luca et al. [17] showed that one-year mortality in patients treated with primary PCI in the first 4 hours was 4.4-4.7%, and increased up to 9.7% in those treated after 6 hours. For each 30-minute delay in treatment with primary PCI, the relative risk of one-year mortality was increased by 7.5% [18]. The results of our study also confirmed that the outcome of primary PCI (late mortality) depends on the time interval between pain onset and treatment. In patients with STEMI, late mortality is also affected by the following factors: age, haemodynamic status, infarct location, additional risk factors and possibly the quality of the ambulatory treatment.

Limitations

Our study is not a randomised controlled study but an observational one – this is the reason for some limitations. The major limitation is the fact that the treatment was not randomised. Therefore, all our conclusions regarding the efficacy of a given treatment strategy are limited and must be taken with caution. Another important limitation of the study is the fact that we do not have detailed data on the total ischaemic time before reperfusion. Nevertheless, various inclusion criteria in the four studied groups allow us to speculate on 'time-mortality' relations.

Conclusions

1. The shortening of the time window for the administration of rt-PA resulted in a greater reduction of 30-day mortality than that showed in previous studies [19].
2. Streptokinase appeared to be inferior to rt-PA; however, this may be due, at least in part, to the inclusion of patients with a longer chest pain duration in the streptokinase-treated group.
3. Our results confirmed the efficacy of thrombolytic therapy administered within the first 3 hours of acute MI. The thirty-day mortality rate in the rt-PA treated group was similar to that in patients treated invasively; however, 26% of rt-PA treated patients required urgent reintervention.
4. The results of primary angioplasty are the best if the intervention is performed early (within 6 vs. 12 hours), and the difference is particularly apparent in the long-term outcome.

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Rokowanie wczesne i odległe u chorych z ostrym zawałem serca z uniesieniem odcinka ST leczonych za pomocą różnych strategii terapeutycznych. Wyniki Wielkopolskiego Rejestru Zawałów Serca 2002 (WIRE)

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Streszczenie

Wstęp: Zastosowanie pierwotnej angioplastyki wieńcowej (PCI) znacznie poprawiło rokowanie u chorych z ostrym zawałem serca (MI), jednakże leczenie trombolityczne nadal jest najczęstszą metodą leczenia, szczególnie w mniejszych ośrodkach. Obecnie w wielu regionach Polski rozwijane są lokalne programy mające na celu optymalizację leczenia chorych z MI.

Cel: Ocena wpływu różnych strategii terapeutycznych na śmiertelność 30-dniową i odległą (średni czas obserwacji 18,3 mies.) u chorych z ostrym zawałem serca z uniesieniem odcinka ST (STEMI) w 3,35-milionowej populacji Wielkopolski (rok 2002).

Metodyka: W 2002 r. 3780 chorych ze STEMI hospitalizowanych w 32 szpitalach w Wielkopolsce zostało włączonych do rejestru. Zgromadzono wszystkie dane dotyczące 3564 (94,3%) chorych. W zależności od sposobu leczenia chorych podzielono na pięć następujących grup: grupa PCI – chorzy w wieku <80 lat oraz do 6 godz. od początku objawów (chorzy „niskiego ryzyka"), leczeni pierwotną PCI w „małym" centrum inwazyjnym, bez 24-godzinnego dyżuru, n=381 (10,7%); grupa PA – chorzy w wieku <70 lat, leczeni tkankowym aktywatorem plazminogenu (rt-PA) do 4 godz. od początku bólu w klatce piersiowej, n=479 (13,4%); grupa IS – strategia inwazyjna dla każdego chorego w dużym ośrodku inwazyjnym z 24-godzinnym dyżurem, niezależnie od wieku chorych i profilu ryzyka, n=989 (27,7%); grupa SK – chorzy otrzymujący standardowe leczenie streptokinazą do 12 godz. od początku objawów, n=584 (16,4%); grupa NR – chorzy, którzy nie otrzymali terapii reperfuzyjnej, n=1131 (31,7%).

Wyniki: Trzydziestodniowa śmiertelność wynosiła w powyższych grupach odpowiednio: w grupie PCI – 3,15%, w grupie PA – 4,38%, w grupie IS – 4,54%, w grupie SK – 9,25% i w grupie NR – 12,5% (p <0,001). Śmiertelność odległa zaś odpowiednio: w grupie PCI – 4,2%, w grupie PA – 9,4%, w grupie IS – 9,4%, w grupie SK – 14,4% i w grupie NR – 18,5% (p <0,001). Pilną koronarografię i angioplastykę wieńcową w grupie PA wykonano u 25% chorych, w grupie SK natomiast u 11% chorych (p <0,001).

Wnioski: Terapia rt-PA u chorych <70. roku życia oraz do 4. godz. od początku objawów może być alternatywą dla postępowania inwazyjnego. Jednakże aż 25% chorych leczonych rt-PA wymagało pilnego leczenia interwencyjnego. W obserwacji odległej wyraźna redukcja śmiertelności utrzymywała się jedynie w grupie leczonej PCI w ciągu 6 godz. od początku objawów.

Słowa kluczowe: zawał serca, tromboliza, pierwotna angioplastyka

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