

Impact of Late Hospital Admission on the Prognosis of Patients with Acute Myocardial Infarction

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ABSTRACT

The objective of this study is to determine the time elapsed from the onset of pain in patients with AMI to their hospital admission (pain to door time) and fibrinolytic administration (door to needle time). The objective is also to determine whether there is a difference between the frequency of fibrinolytic administration to patients and the survival rate of patients with AMI with respect to the location they are transported from. This prospective clinical study included patients manifesting clear clinical, electrocardiographic and biochemical evidence of AMI, according to criteria of ECS (European Society of Cardiology), and who were admitted to the Coronary Care Unit of Split Clinical Hospital in the period from 1 January to 31 December 1999. On the basis of their residence, the patients were divided into three groups: 1. patients from Split and the surrounding area distant up to 15 km from the city; 2. patients from the surrounding area within 15 km from Split, 3. patients living on the islands of Central Dalmatia. 409 patients with AMI were admitted to hospital in the period in question. The first group consisted of 207, the second of 163, and the third of 39 subjects (254:39; $p < 0.001$). The median time from the onset of pain to hospital admission for all patients with AMI was 7.3 hours, for patients from the islands 13 hours, whereas for those coming from locations distant more than 15 km from Split it amounted to 7.6 hours ($p < 0.001$). The number of patients that were administered fibrinolysis is extremely low (17.1 %) and there is no significant difference in the frequency of fibrinolytic administration between certain patient groups ($p > 0.05$). Similarly, the mortality rate prior to hospital discharge is high (18.8 %) and does not vary among the three studied groups ($p > 0.05$). The results of this study are in opposition to the assumption that the mortality rate will be lower in patients living in Split and the immediate surroundings when compared to the mortality rate of patients living on the islands of Central Dalmatia (21.7% : 15.4%).

Key words: acute myocardial infarction, pain to door time, transportation to hospital, surviving

Introduction

Present-day treatment of patients with acute myocardial infarction (AMI) includes primarily early reperfusion of the myocardium which reduces the necrotic area, prevents damage to the pumping function of the heart, and sudden death¹. The period from the onset of the first symptoms of acute myocardial infarction to fibrinolytic administration is the pivotal moment on which the efficiency of fibrinolysis depends².

According to ECS recommendation, the time elapsed from hospital admission, i.e. emergency admission to FT (fibrinolytic treatment) (door to needle time) must not exceed 20 minutes. In order to treat AMI in line with currently recommended standards, the time elapsed from the onset of the first symptoms of the disease to FT ad-

ministration (pain to needle time) should not exceed 90 minutes³. In West European countries this time equals to approximately 4 hours^{4,5}, whereas in Split, in the period from 1981 to 1987, it equalled to approximately 15 hours⁶.

Thrombolytic treatment is more efficient if administered in the early stage of the disease, particularly within 2 hours, when necrosis of more than 50% of the ischemic myocardium may be prevented^{2,3}. After 6 hours of ischemia, necrosis of the myocardium occurs, which is the reason why fibrinolytic administration within 90 minutes from the patient's call (call-needle time), or within a period shorter than 30 minutes (door-needle time) is desirable^{3,7}.

Out of hospital fibrinolytic administration is useful in rural areas with poor traffic connections and the islands where patient transport depends on climatic conditions and geographic factors. The conducted studies revealed a surprisingly low number of patients with AMI treated with fibrinolytic administration in these areas in comparison to urban areas with good traffic connections^{3,5}. Unfortunately, in our country, out-of-hospital fibrinolytic treatment is not administered anywhere, which includes our islands. Urgent transportation of patients from this area is performed by ambulances, speedboats or helicopters. Nevertheless, patients with AMI arrive at the hospital too late. The solution appears to be a mobile coronary care unit (mob CCU) in an ambulance, or, in the case of remote health centres, a minor coronary care unit (minor CCU), which consists of professionally trained staff, a defibrillator with a monitor and, possibly, transthoracic heart stimulation^{8,9}.

Instead of urgent patient transportation, it is better to monitor and, if necessary, defibrillate, resuscitate and administer fibrinolytic treatment (FT) or sometimes send patient data (ECG, history) to a major facility via telemedicine and thus consult a hospital cardiologist^{10–13}.

Objective of the Study

The objective of this study is to determine the time elapsed from the onset of pain in patients with AMI to their admission to hospital (so called pain to door time) and fibrinolytic administration (so called door to needle time) and the way it affects the survival of patients with AMI.

Patients and Methods

Patients

The clinical study was conducted prospectively and openly. It covered patients of both sexes with clear clinical, electrocardiographic and biochemical evidence of AMI¹, who were admitted to Coronary Care Units of Split Clinical Hospital in the period from 1 January to 31 December 1999.

Criteria for AMI diagnosis were:

a) clinical

Chest pain lasting more than 20 minutes which does not respond to glyceril nitrate.

b) electrocardiographic

For myocardial infarction with Q wave: Q waves in precordial leads from V1 to V3, Q waves =30 ms in I, II, aVL, aVF, V4, V5, V6. The amplitude of Q waves must exceed 1mm and they must be present in any two adjacent leads.

For myocardial infarction without Q wave: absence of the Q wave at least 12 hours from the onset of pain.

c) biochemical

Significant increase of creatine phosphokinase (CK) with MB fraction exceeding 10% to 15%.

Depending on the location they were transported from, the patients were divided into three groups:

1. patients from Split,
2. patients from localities distant more than 15 km from Split,
3. patients from the islands.

Test performance

Based on a detailed history, each patient admitted to the Coronary Care Unit with an established suspicion of AMI was subjected to a standard 12-channel electrocardiogram and the following laboratory tests: CK, CK-MB, alanine transferase (ALT), aspartate transferase (AST), and lactate dehydrogenase (LDH). If a period of at least six hours elapsed since the onset of pain, venous blood for laboratory tests was taken immediately on admission and again the next day.

For each patient, the following was recorded on individual test lists: residence, onset of pain, time elapsed from the onset of pain to the emergency call (pain to call time), time from the arrival of the ambulance, to emergency admission in ER (call to door time) and the time elapsed from transport of the patient to the emergency admission to the arrival to the coronary care unit (CCU) or administration of fibrinolytic agents (FT) (door to needle time), if the patient was given any. FT administration and the outcome of the treatment (survival, death) were recorded.

Tests and measurements

Electrocardiography

Standard 12-channel electrocardiogram was recorded on a 3-channel electrocardiograph Cardiostat 31, produced by Siemens-Elema AB.

Creatine phosphokinase

The activity of creatine phosphokinase was determined using the IFCC-UV method, at 30°C, on the device Hitachi 917. Reference values are 5–170 j/l.

MB fraction of creatine phosphokinase

The activity of MB fraction of creatine phosphokinase was automatically measured from the activity of CK, at 30°C, on the device Hitachi 917. Reference values are 6–25 % of the total CK activity.

Result analysis

The data for each patient was entered into individual test lists. Data was presented through numbers: in tables and graphic form. The significance of observed differences was checked by means of the Student's t-test, χ^2 -test, Kruskal Wallis variance analysis, the Wilcoxon-Mann-Whitney test and logistic regression analysis. The differences with a $p < 0.05$ were considered to be statistically significant.

TABLE 1
BASIC CHARACTERISTICS OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION ADMITTED TO THE CORONARY CARE UNIT OF THE CLINICAL HOSPITAL

Variable	Number of patients (%)
Sex:	
Women	155 (37.9%) ^o
Men	254 (62.1%) ^o
Residence:	
Split and surroundings within 15km	207 (50.6%) [¶]
Islands	39 (9.5%) [¶]
Surroundings distant more than 15km	163 (39.9%)
Acute myocardial infarction:	
With Q wave	366 (89.5%)
Without Q wave	43 (10.5%)
Localisation of infarction with Q wave:	
Anterior	173 (47.3%)
Inferior and posterior	167 (45.6%)
Lateral	20 (5.5%)
Other	6 (1.6%)
Fibrinolysis:	
Yes	70 (17.1%)
No	339 (82.9%)
Age: ($\bar{X} \pm SD$) years	
All	67.5 \pm 12
Female	71.2 \pm 11.4*
Male	64.0 \pm 12.4*

^o $p < 0.001$

[¶] $p < 0.001$

[•] $p < 0.001$

* $p < 0.001$

Abbreviations: \bar{X} -arithmetic mean, SD-standard deviation.

Results

In the period studied, a total of 409 patients with acute myocardial infarction were admitted to hospital, out of which 254 were male and 155 female. There were 207 patients from Split and the immediate surroundings within 15 km from the city. 163 patients came from the surroundings distant more than 15 km, whereas 39 patients came from the islands of Central Dalmatia. A significantly larger number of patients with AMI coming from Split and the immediate surroundings was admitted to hospital in respect to the number of patients with AMI living on the islands (254:39; $p < 0.001$) (Table 1).

Median time from the onset of pain to hospital admission for all patients with acute myocardial infarction was 7.3 hours, for patients coming from the islands 13 hours, whereas for those coming from locations distant more than 15 km from Split it equalled 7.6 hours ($p < 0.001$). This implies that the latter were admitted to hospital considerably later (5.3 hours: 13.0 hours: $p < 0.001$) (Table 2).

The number of patients who were administered fibrinolytic treatment is extremely low (17.1%). There is no significant difference in the frequency of fibrinolytic administration in the group of patients with AMI living in the city and immediate surroundings in respect to the percentage of fibrinolytic administration to patients with AMI transported from the islands ($p > 0.05$). The mortality rate on hospital discharge is also high (18.8%) and does not differ among the three studied groups ($p > 0.05$).

Out of 187 patients with AMI who arrived within 6 hours from the onset of pain, 41 (22.4%) patients died. Out of that number, 95.1% had AMI with Q wave and 4.9% AMI without Q wave. The recorded mortality was significantly higher in patients with myocardial infarction with Q wave (39:2; $\chi^2 = 48.8$; $p < 0.001$). Out of 169 patients with AMI with Q wave who arrived to CCU within 6 hours, 68 (36.4%) was treated with fibrinolytic. In the case of 68 (97.1%) patients, FT was administered within the first 6 hours from the onset of pain, whereas 2 (2.9%) received it in the period between 6 and 12 hours. No patient was administered fibrinolysis after 12 hours (Figure 1).

Out of a total of 169 patients with myocardial infarction with Q wave who arrived at the CCU within 6 hours, 39 (23%) died. The number of dead patients is lower in the group treated by fibrinolysis in comparison to those who did not receive fibrinolytic treatment. In terms of statistics, we did not find a significant difference between the number of dead patients with AMI with Q wave who were administered FT within the first 6 hours of the disease and those who did not (27:5; $\chi^2 = 1.8$; $df = 1$; $p = 0.18$) (Figure 2).

Discussion

The time elapsed from the onset of pain to the arrival to the CCU and FT administration is the most important criterion for fibrinolytic administration¹⁻³.

TABLE 2
THE CORRELATION BETWEEN THE PATIENT'S RESIDENCE AND THE CLINICAL CHARACTERISTICS AND THE TIME ELAPSED FROM THE ONSET OF SYMPTOMS OF ACUTE MYOCARDIAL INFARCTION TO HOSPITAL ADMISSION

Variable	Split and surrounding within 15 km N (%)	Surroundings of Split distant more than 15 km from Split N (%)	Islands N (%)	p
Sex:				
Women	77 (37.2%)	60 (36.8%)	18 (46.2%)	0.55
Men	130 (62.8%)	103 (63.2%)	21 (53.8%)	
Pain-CCU:				
= 6 hours	110 (53.1%)*	69 (42.3%)	8 (20.5%)*	0.00
6–12 hours	37 (17.9%)	50 (30.7%)	9 (23.1%)	
>12 hours	60 (29.0%)*	44 (27.0%)	22 (56.4%)*	
MI:				
with Q wave	185 (50.5%)	144 (39.3%)	37 (10.2%)	0.48
without Q wave	22 (51.2%)	19 (44.2%)	2 (4.6%)	
Fibrinolysis:				
No	167 (80.7%)	139 (85.3%)	33 (84.6%)	0.53
Yes	40 (19.3%)	24 (14.7%)	6 (15.4%)	
Dead:				
Yes	45 (21.7%)	26 (16.0%)	6 (15.4%)	0.46
No	162 (78.3%)	137 (84.0%)	36 (84.6%)	
Age (years)	65.5±1.3	65.6±12.3	64.4±11.6	0.85
Median (hour):				
Pain to call	2.8	2.5	4.2	0.48
Pain to EMS	3.7	4.4	6.3	0.12
Pain to door	4.5	6.8	12.5	0.00
Pain to CCU	5.3	7.6	13.0	0.00

Abbreviations: pain to call-time from the onset of pain to the arrival of the Emergency Medical Service, pain to EMS-time from the onset of pain to the arrival of Emergency Medical Service, pain to door-time from the onset of pain to the arrival to emergency admission, pain-CCU-time from the onset of pain to the arrival to the Coronary Care Unit.

FT is administered only in the case of patients with acute myocardial infarction with permanent ST segment elevation admitted to hospital mostly within 6 hours from the onset of pain, rarely between 6 and 12 hours and only exceptionally 12 hours after the onset of pain¹⁴. Fibrinolytic administration within 6 hours saves 30 lives out of 1000 treated patients, administration from 6 to 12 hours saves about 20 patients, whereas administration after 12 hours has no effect on survival^{2,5,15}. We have, therefore, due to its importance, divided the time from onset of pain to the hospital admission into four intervals: time from the onset of pain to the emergency call, time from the emergency call to the arrival of the Emergency Medical Service or arrival to the ER, time elapsed from the arrival of the Emergency Medical Service to emergency admission, and time from emergency admission to CCU, i.e., for those who received FT, time to FT

administration^{1,16,17}. A study conducted in the area of Zagreb in 1996 has shown that patients with AMI symptoms call for help very late which is an indicator of poor awareness of the general public of AMI symptoms¹⁸. In comparison to the said study, our patients called for help a bit sooner, within 2.8 hours, but the period from the onset of the first symptoms of acute myocardial infarction to the call for help was still too long. The majority asked for help later than an hour after the onset. These patients should be admitted to hospital within 90 minutes from the onset of pain^{20–22}. Due to the fact that a large number of our patients (69.4 %) calls for help when it is too late, the reason for a high mortality rate in our patients with AMI (18.8%) is understandable.

Unlike other similar studies, we did not establish a significant difference in the pain to call time with respect to sex, age, AMI localisation and residence^{10,18}.

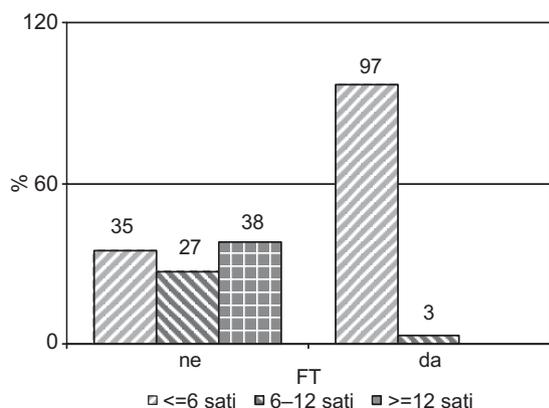


Fig. 1. Patients with acute myocardial infarction with Q wave according to the time of their arrival to the Coronary Care Unit and fibrinolytic administration. FT-fibrinolytic treatment.

Time from call to the arrival of the Emergency Medical Service and to the emergency admission may be taken as an indicator of efficiency and organisation of Emergency Medical Services. In many European countries and in the USA this assistance is prompt and efficient, both in urban areas and in areas with good traffic connections. Nevertheless, this was not the case in remote rural areas where the speed of transport depends on the means used^{3,5,8}. As opposed to the previous, we found that the time elapsed from the call for help to the arrival of Emergency Medical Service to the patient is longer and lasts 4.3 hours. Although it is not significant (i.e. it has been recorded with a relatively small number of patients), a difference in the speed of arrival of EMS to patients in Split and the surroundings within 15 km was recorded, with the speed of arrival being shortest (3.7 hours). The EMS arrived to patients living in the surroundings distant more than 15 km from Split later (4.4 hours), and it was especially late on the islands (12.5 hours). In remote locations and on the islands one EMS team covers a vast area and often receives more calls at the same time. This is particularly common on the islands in the summer months.

The time elapsed from the arrival of EMS to the emergency admission of our hospital is long (7.6 hours) and differs significantly depending on the location patients with AMI are transported from. Patients from Split are transported most quickly (4.5 hours), whereas those coming from the islands of Central Dalmatia take the longest to transport (12.5 hours), and they, unfortunately, sometimes are not even transported due to adverse weather conditions. While waiting for help, transport, and hospital admission, part of the patients die a sudden death due to early atrial fibrillation as part of the acute coronary syndrome. Those who are admitted to hospital come too late to be administered efficient reperfusion treatment.

Unlike in major studies^{4,8,19,20}, our patients with AMI were admitted to hospital late, after more than 7.3 hours. But, when compared to the period 1981 to 1987²³, they

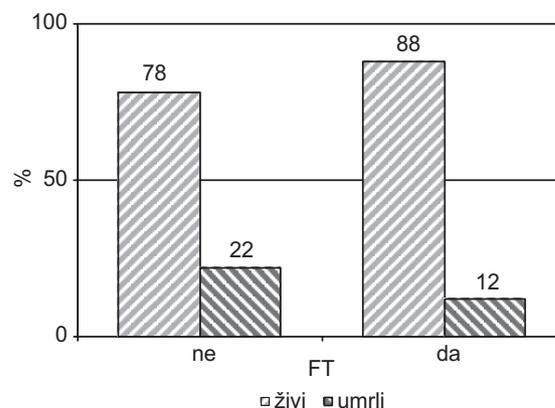


Fig. 2. Representation of the survival of patients with acute infarction with Q wave who arrived to the Coronary Care Unit within 6 hours from the onset of pain, based on fibrinolytic administration. FT-fibrinolytic treatment.

were admitted to hospital sooner (7.3 hours: 15.8 hours). Patients from Split were admitted to hospital within six hours from the onset of the disease (when fibrinolysis is most commonly administered), whereas the group of patients admitted to hospital after 12 hours consisted mostly of patients transported from the islands of Central Dalmatia. This is another proof of lack of adjustment of Emergency Medical Services on our islands, which is further intensified by requirements posed by remoteness and bad traffic connections.

As a consequence of late arrival or non-arrival of patients from remote areas, particularly the islands, to hospital, the prognosis for such patients is worse since they arrive too late for FT and antiarrhythmic treatment (e.g. fibrinolysis) the aim of which is to protect part of the muscle mass and reduce mortality. This calls for changes in the management of ambulance services on the islands (e.g. administration of FT on the islands) with a possible assistance of telemedicine, the organisation of minor CCUs with a professionally trained and well-equipped team (defibrillator, drugs, etc.) and well-organised transport by, for instance, helicopters.

The results of our study show that in this Clinical Hospital fibrinolytic treatment is administered quite rarely, in 17.1% patients, whereas in patients with AMI arrived from the islands even less frequently, only in 14.5%. In the case of patients admitted to hospital within 6 hours from the onset of pain, it is administered to 36% patients, whereas in those admitted in the period from 6 to 12 hours in less than 3%. However, the problem is that a small number of our patients arrived within the first 6 hours from the onset of the disease. Within 6 hours, about 42.0% patients from the greater Split area were admitted to hospital, as opposed to only 20.5% patients coming from the islands. The median time from the onset of pain to the arrival of CCU for the greater Split area is 7.6 hours, whereas for patients coming from the islands it equals 13.0 hours.

Therefore, thrombolysis may, and in these conditions probably should, be administered out of hospital (i.e. on the islands), especially when transport time exceeding 30 minutes is expected, which is the rule anywhere except in Split, and particularly on the islands. It is also important that the time of hospital delay (time elapsed from the hospital door to fibrinolytic administration) should not exceed 30 minutes. Otherwise, a revision of the system of acute coronary syndrome patients should be performed^{15,21,22}.

Although it is not significant (probably due to the relatively low number of patients), the mortality rate of patients treated with fibrinolysis (12%) was lower than in those who were not given FT (28%). In the so called FTT meta analysis, the average time from the onset of pain to the streptokinase administration was 6.7 hours²³. This implies that every hour of delay of FT administration increases the mortality by 1.6 patients/1000. In our study the median time from the onset of pain to streptokinase administration amounted to 3.2 hours. Such a period is too long when the fact that fibrinolytic administration is optimal within 90 minutes from the onset of pain is taken into consideration. Due to the delay in administration, the effect of FT is weaker, and the number of complications higher (e.g. early myocardium rupture)^{3,14,15}.

Since in the Croatian population the prevalence of major myocardial infarction risk factors accounts for over 90% of the population attributable risk²⁴, it is extremely important to determine the time elapsed from the onset of the initial MI symptoms to the hospital admission. The results of this study are in collision with the assumption that mortality will be lower in patients living in Split and the closer surroundings than in patients living on the islands of Central Dalmatia (21.7%:15.4%) (Table 2). This may be explained by the fact that less patients coming from the islands are admitted to hospital due to the distance and that a large number of them died before arriving to the hospital without receiving medical care. Such results call for reorganisation of Emergency Medical Services on the islands and in remote areas. Furthermore, the need for out-of-hospital fibrinolytic treatment administration is evident along with efficient cardiopulmonary reanimation and prompt defibrillation performed by a general practitioner.

Conclusions

On the basis of this prospective clinical study conducted on 409 patients with acute myocardial infarction we may conclude that:

1. A period of as much as 7.3 hours elapses from the onset of pain in patients with acute myocardial infarction to their hospital admission.
2. Patients living in remote locations (farther than 15 km from Split and those living on the islands of Central Dalmatia) are admitted to hospital very late, as late as 13 hours.
3. Most of our patients with acute myocardial infarction called Emergency Medical Service quite late (after 2.8 hours instead of within an hour, as recommended).
4. Patients with AMI are transported by the Emergency Medical Service when it is too late (after 4.3 hours) and the period is even longer in the case of patients coming from the islands of Central Dalmatia (after 12.5 hours).
5. Fibrinolytic administration in the case of all patients with acute myocardial infarction is too scarce (17.1%).
6. Mortality of patients with acute myocardial infarction prior to dismissal from hospital is comparatively high (18.8%).
7. The most frequent cause of death of our patients with AMI is cardiogenic shock.
8. A small number of patients deceased due to atrial fibrillation may be explained by a high mortality rate within the first few hours from AMI, a fact which has not been recorded in this study.

All the aforementioned implies that:

- a) Admission of patients with acute myocardial infarction to hospital is late, which causes a high mortality rate.
- b) In order to spread information on acute coronary syndrome and reduce the pain to door time, it is necessary to raise public awareness (through the media, public lectures, etc.)
- c) It is undoubtedly necessary to perform a reorganisation of Emergency Medical Services (especially on the islands and in the Dalmatian hinterland (Dalmatinska Zagora) in order to promote efficiency. The level of technical equipment of out-of-hospital teams for fibrinolytic administration, prompt defibrillation and efficient resuscitation should be improved.
- d) It is necessary to integrate all remote Emergency Medical Services (where the aforementioned functions would be performed) into a unique telemedicine system with the centre in Split University Hospital Center where permanent supervision of a cardiologist is necessary.

REFERENCES

1. THE TASK FORCE ON THE MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION OF THE EUROPEAN SOCIETY OF CARDIOLOGY, *Eur Heart J*, 17 (1996) 43. DOI: 10.1093/oxfordjournals.eurheartj.a014691. — 2. THE GUSTO INVESTIGATORS, *N Engl J Med*, 329 (1993) 673. DOI: 10.1056/NEJM199309023291001. — 3. NATIONAL HEART ATTACK ALERT PROGRAM COORDINATING COMMITTEE – 60 MINUTES TO TREATMENT WORKING GROUP, *Ann Emerg Med*, 23 (1994) 311. DOI: 10.1016/S0196-0644(94)70045-1. — 4. THE EUROPEAN MYOCARDIAL INFARCTION PROJECT GROUP, *N Engl J Med*, 329 (1993) 383. DOI: 10.1056/NEJM199308053290602. — 5. BRITISH HEART FOUNDATION WORKING GROUP, *Brit Med J*, 229 (1989) 555. — 6. MIRIĆ D, RUMBOLDT Z, PULJIZ LJ, I BOŽIĆ, *Liječ Vjesn*, 112 (1990) 95. — 7. HITCHCOCK T, ROSSOUW F, MC COUBRIE D, MEEK S, *Emerg Med J*, 20 (2003) 270. DOI: 10.1136/emj.20.3.270. — 8. THE JOINT EUROPEAN SOCIETY OF CARDIOLOGY/AMERICAN COLLEGE OF CARDIOLOGY COMMITTEE, *Eur Heart J*, 21 (2000) 1502. DOI: 10.1053/euhj.2000.2305. — 9. MATHEW TP, MENOWN IBA, MC CARTY D, GRACEY H, HILL L, ADGEY AAJ, *Eur Heart J*, 24 (2003) 161. DOI: 10.1016/S0195-668X(02)00521-3. — 10. NORRIS RM, *BMJ*, 316 (1998) 1065. DOI: 10.1136/bmj.316.7137.1065. — 11. GUSTO INVESTIGATORS, *N Engl J Med*, 329 (1993) 673. DOI: 10.1056/NEJM 199309023291001. — 12. COLQUHOUN MC, JULIEN DG, *Resuscitation*, 24 (1992) 177. DOI: 10.1016/0300-9572(92)90057-J. — 13. BAIGENT C, COLLINS R, *Circulation*, 329 (1993) 703. — 14. GUIDELINES FOR THE MANAGEMENT OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION: EXECUTIVE SUMMARY, *Circulation*, 94 (1996) 2341. DOI: 10.1161/01.CIR.94.9.2341. — 15. BOERSMA E, MAAS ACP, DECKERS JW, SIMOONS ML, *Lancet*, 348 (1996) 771. DOI: 10.1016/S0140-6736(96)02514-7. — 16. CANTO JG, KIEFE CI, *Am Heart J*, 150 (2005) 365. DOI: 10.1016/j.ahj.2005.04.026. — 17. SCHULL MJ, VERMEULEN M, DONOVAN L, NEWMAN A, TU JU, *Am Heart J*, 150 (2005) 583. DOI: 10.1016/j.ahj.2005.03.061. — 18. VINCELJ J, BERGOVEC M, SOKOL I, PUTAREK K, *J Clin Bas Cardiol*, 1 (1998) 30. — 19. SVENSSON L, KARLSSON T, NORDLANDER R, WAHLIN M, ZEDIGH C, HERLITZ J, *Int j cardiol*, 88 (2003) 247. DOI: 10.1016/S0167-5273(02)00415-1. — 20. MORROW DA, ANTMAN EM, SAYAH A, SCHUHWERK KC, GIUGLIANO RP, de LEMOS JA, WALLER M, COHEN A, ROSENBERG DG, CUTLER SS, McCABE, WALLEES RM, BRAUNWALD E, *Am Coll Cardiol*, 40 (2002) 71. DOI: 10.1016/S0735-1097(02)01936-8. — 21. MORRISON LJ, VERBEEK PR, MC DONALD AC, SAWADSKY BV, COOK DJ, *Jama*, 283 (2000) 2686. DOI: 10.1001/jama.283.20.2686. — 22. LEARMONTH SR, IRELAND A, McKIERNAN CJ, BURTON P, *Emerg Med J*, 23 (2006) 79. DOI: 10.1136/emj.2004.022376. — 23. FIBRINOLYTIC THERAPY TRIALISTS' (FTT) COLLABORATIVE GROUP, *Lancet*, 343 (1994) 311. — 24. CAREVIĆ V, KUZMANIĆ M, RUMBOLDT M, RUMBOLDT Z, INTERHEART INVESTIGATORS, *Coll Antropol*, 34 (2010) 1363.

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UTJECAJ ZAKAŠNJELE HOSPITALIZACIJE NA PROGNOZU BOLESNIKA S AKUTNIM INFARKTOM MIOKARDA

SAŽETAK

Cilj ovog istraživanja je odrediti koliko vremena prođe od početka boli u bolesnika s AIM do hospitalizacije (tzv. pain to door vrijeme) i primjene fibrinolize (tzv. door to needle vrijeme). Cilj je također utvrditi postoji li razlika u učestalosti primjene fibrinolize i preživljavanja bolesnika s AIM s obzirom na mjesto odakle su dovezeni. U ovom prospektivnom kliničkim ispitivanjem obuhvaćeni su bolesnici koji su imali jasne kliničke, elektrokardiografske i biokemijske znakove AIM, po kriterijima prema ECS (engl. European Society of Cardiology), a bili su hospitalizirani u Jedinici koronarne skrbi KB Split, u vremenu od 01. siječnja do 31. prosinca 1999. godine. Ovisno o mjestu stanovanja, ispitanici su podijeljeni u tri skupine: 1. bolesnici iz Splita i okolice, udaljene do 15 km od Grada; 2. bolesnici iz okolice udaljene više od 15 km od Splita, 3. bolesnici koji žive na srednjedalmatinskim otocima. U ispitivanom vremenskom periodu hospitalizirano je 409 bolesnika s AIM. Iz prve skupine bilo je 207, iz druge 163 bolesnika, a iz treće 39 ispitanika (254:39; $p < 0,001$). Medijan vremena od početka boli do hospitalizacije za sve bolesnike s AIM je iznosio 7,3 sata, a za bolesnike s otoka 13 sati, onih iz mjesta udaljenih više od 15 km od Splita iznosio je 7,6 sati ($p < 0,001$). Broj ispitanika u kojih je primijenjena fibrinoliza izrazito je niska (17,1%) i nema značajne razlike u učestalosti primjene fibrinolize između pojedinih skupina bolesnika ($p > 0,05$). Isto tako i smrtnost do izlaska iz bolnice visoka je (18,8%) i ne razlikuje se u tri ispitivane skupine ($p > 0,05$). Rezultati ovog ispitivanja u suprotnosti su s pretpostavkom da će manja smrtnost biti u bolesnika koji žive u Splitu i užoj okolici, od smrtnosti bolesnika koji žive na srednjedalmatinskim otocima (21,7%:15,4%).