ROLE OF ELECTROCARDIOGRAPHY IN THE DIAGNOSIS OF ACUTE CORONARY SYNDROMES. PROGNOSIS DEPENDING ON THE TIME OF DIAGNOSIS AND THERAPEUTIC METHODS

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Keywords: evolving myocardial infarction, myocardial infarction up **Abstract:** A higher rate of composite values representing mortality, reinfarction and stroke were observed in individuals with established clinical myocardial infarction versus those who had evolving over a period of 2.5 years follow-up (10.6 [9.4-13.9] and 6.6 [5.6-8.0] per 100 person - years and RR 1.6, p < 0.001). The difference was explained by a higher mortality in the group showing clinical myocardial established. This result is explained by the fact that the time from symptom onset to randomization and the treatment time was higher in patients with clinical myocardial established. We found that the pattern of evolving myocardial infarction was associated with a lower rate of events with overall long-term effects in patients undergoing primary percutaneous coronary intervention compared to those receiving fibrinolytic therapy. (4.5 [3.4 to 5.9] and 7.5 [6.0-9.4] per 100 person - years, RR = 0.6, p = 0.004).

Cuvinte cheie: infarct miocardic în evoluție, infarct miocardic constituit **Rezumat:** O rată mai mare a valorilor compuse reprezentând mortalitatea, reinfarctizarea și accidentul vascular cerebral au fost observate la persoanele cu infarct miocardic clinic constituit, versus persoanele care prezentau infarct miocardic în evoluție, pe o perioadă de urmărire de 2.5 ani (10.6 [9.4-13.9] și 6.6 [5.6-8.0] la 100 persoane - ani, respectiv RR 1.6, p < 0.001). Diferența a fost explicată de o mortalitate mai mare în grupul care prezintă infarct miocardic clinic constituit. Acest rezultat este explicabil prin faptul că, timpul scurs de la debutul simptomatologiei până la momentul randomizării și aplicarea tratamentului a fost mai mare la pacienții care prezentau infarct miocardic clinic constituit. Am descoperit că tiparul infarctului miocardic în evoluție a fost asociat cu o rată mai mică a evenimentelor cu efecte pe termen lung per total la pacienții tratați prin intervenție coronariană percutană primară, în comparație cu cei tratați prin terapie fibrinolitică. (4,5 [3,4-5,9] și 7.5 [6.0-9.4] per 100 persoane ani, RR=0.6, p=0.004).

OBJECTIVES

Investigating the distribution of two distinct patterns of ECG in acute myocardial infarction with ST-segment elevation and ECG characteristics impact on the evolution of patients treated by PCI procedure (percutaneous coronary intervention) or fibrinolytic therapy.

METHODS

Criteria for inclusion in the study were chest pain lasting 30 minutes maximum, onset of symptoms to up to 12 hours before randomization and summative elevation on ECG ST segment measured to be greater than or equal to 4 mm measured from the point J (≥ 2 mm in at least 2 of leads I, aVL, V1-V6 and ST elevation is ≥ 1 mm in all 4 derivatives II, III, V5-V6 and ST elevation is ≥ 2 mm in at least 2 in leads II, III, V5-V6). The patients were enrolled in the study between 2010 and 2012. The patients were selected from the Emergency County Hospital Oradea. Randomly, it was established that those with MI and ST-segment elevation to undergo fibrinolytic therapy or primary angioplasty.(1,2,3)

Exclusion criteria were: contraindications to fibrinolysis, sepsis, aortic aneurysm with a thrombus oscillating, lack of femoral pulse or femoral vascular grafts bilateral existence of coronary bypass grafting, severe renal insufficiency with creatinine> 250 micromol / L, diabetics treated with metformin in the last 48 hours, interval greater than 3 hours from randomization to catheterization, patients with acute MI (Q wave or without) appeared in the last 30 days, increased risk when transported by ambulance (cardiogenic shock or heart failure with severe hypotension - systolic blood pressure> 65 mmHg), severe cardiac arrhythmias, the presence of LBBB, LVH on ECG, BRD together with previous hemibloc left, pacemaker. A total of 382 patients have been selected that were included in this study.

RESULTS

Lateral STEMI was rarely met with massive ST deviation (≥ 2 mm ST segment elevation in at least 2 of leads I, aVL, V5-V6). Finally, there were 379 patients with acute myocardial infarction. There were not included in the statistical analysis the patients whose ECG showed signs of supra-acute myocardial infarction with ST segment supraelevation because of the reduced number of cases (n = 2).

Location and distribution of myocardial infarction ECG pattern

Of the 379 patients, 197 (51.98%) had acute myocardial infarction with anterior ST segment supraelevation and 182 (48.02%) had acute myocardial infarction with ST

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segment elevation as shown below ECG recordings. Among patients with anterior STEMI, 102 had AMI in development (EMI) and a number of 95 patients were diagnosed with clinically established MI (MIC) above. Among patients with STsegment elevation in the inferior territory, 146 were diagnosed with EMI and 36 patients with MIC. ECG pattern in patients with EMI was more common than in patients with acute myocardial infarction with ST segment elevation before (n =146, 59% versus. n = 102, 41%). Inferior myocardial ECG patterns in patients with MIC were rare (27.5%). Patients were divided into subgroups according to their ECGs: EMI (n = 248, 65.43%) and MIC (n = 131, 34.56%). Clinical MI group was also formed depending noted signs of reperfusion. Report combined end-point (death, myocardial infarction, stroke) was higher in groups who had heart attacks than those established clinically evolving myocardial infarction (10.6 [9.4-13.9] and 6.6 [5.6-8.0] per 100 persons - years and RR 1.6, p <0.001). The difference could be explained by the fact that the EMI group mortality was higher than in the group with MIC (9.5 [8.7-11.4] and 4.52 [3.2-5.3] per 100 person - years and RR 2.1, p <0.001) (figure no. 1).

Figure no. 1. The rate of combined end-point of major events to 2.5 years for patients with a myocardial ECG pattern evolving myocardial infarction or clinically established



In a multivariate analysis, ECG in clinical infarction group consisting offered a poor prognosis compared with ECGs performed in the group with evolving myocardial Other variables that provided independent prognosis in multivariate analysis were age \geq 75 years, treatment with aspirin, lipidlowering treatment, previous myocardial infarction and old myocardial infarction on ECG (table no. 1).

Table no. 1. The results of multivariate Cox analysis including risk facto relationship between variables and verifies pre-defined composite values to 2.5 years after the stroke

Variable	Hazard	Confidence	P-valve
	ratio (RR)	interval 95%	
Age≥75 years	2,894	2,132-3,802	0,001
Class Killip >1	1,414	0,958-2,092	0,081
HR>100 b/min	1,499	0,994-2,264	0,607
MI previous	1,321	1,002-1,739	0,0048
Diabetes	1,486	0,982-2,252	0,061
High blood pressure	1,551	0,850-1,558	0,362
Smoking	1,031	0,785-1,353	0,829
Male	1,092	0,797-1,497	0,582
Lipid-lowering	0,399	0,192-0,826	0,013
treatment			
Treatment of aspirin	1,859	1,395-2,475	0,001
ECG signs of MI	1,524	1,009-2,203	0,045
PCI	0,884	0,637-1,522	0,942

Among patients with EMI (n = 248), the rate of composite values were lower in patients treated with primary

percutaneous coronary intervention compared to those receiving fibrinolytic therapy (4.5 [3.4-5.9] and 7.5 [6.0-9.4] per 100 people -years and RR = 0.6, p = 0.0004) (figure no. 2). This difference was explained by the reduction of re-infarction rate in primary percutaneous coronary intervention to fibrinolytic therapy group (3.5 [2.1-4.3] and 7 [5.2-8.7] per 100 person-years, respectively RR 0.5, p <0.0001) (figure no. 2).

Figure no. 2. Kaplan-Meier curve showing cumulative hazard ratio for events in terms of death, reinfarction or stroke during follow-up in patients with EMI (evolving myocardial infarction) and treated with primary percutaneous coronary intervention or fibrinolytic therapy. Values of P were calculated using log-rank test



There were no significant differences in mortality, reinfarction, or stroke after 2.5 years elapsed between the two treatments in patients with clinically established MI (n = 131). In the group with clinical myocardial territory previously established, patients without documented by ECG signs of reperfusion (n = 55) treated with percutaneous coronary intervention have better prognosis than those treated with fibrinolytic therapy (table no. 2).

Figure no. 3. Values compound and reference type as a result of the passage of 2.5 years in patients with EMI (evolving myocardial infarction) who were randomized to percutaneous coronary intervention or fibrinolytic therapy



In this group, the superiority of primary PCI with fibrinolytic therapy was as a result of 51% reduction in the relative risk of major events combined. This difference could be explained by the decrease in the death rate in primary percutaneous coronary intervention group compared to the group that was treated with fibrinolytic therapy (5.7 [3.3-10.1] and 13.9 [9.6-20.7] per 100 person - years and RR 0.4, p = 0.007) (figures no. 3,4). If clinical myocardial territory constituted inferior without ECG signs of reperfusion shown the likelihood combined end-point was higher in the group treated by percutaneous coronary intervention than fibrinolytic therapy (figure no. 5).

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Figure no. 4. End-point rate combined death, re-infarction and stroke occurrence labolnavii with previous myocardial infarction presenting ECG pattern formed without clinical signs of reperfusion treated with primary percutaneous coronary intervention or fibrinolytic therapy



Table no. 2. Values composite of death, re-infarction, stroke him, at 2.5 years after surgery in patients with established clinical myocardial reperfusion according to signs that can be read on the ECG (O waves presence)

ECG pattern		Combind end-point (%),n		P-value
		PCI	fibrinolysis	
Pr	Previous MIC (n=95)			
	no reperfusion, n=55	20%, n=11	38%,n=21	0,09
	Incomplete reperfusion,n=40	32%,n=13	26%,n=10	0,72
IM	ICC inferior,(n=36)	lower MIC,(n=36)		
	no reperfusion,n=20	35%,n=7	0	0,01
	Incomplete reperfusion,n=16	21%,n=3	32%,n=5	0,75

Figure no. 4. Kaplan Meier curve which shows the proportion of patients with previous MIC depending on the rate of reperfusion experiencing major events



Figure no. 5. Kaplan Meier curve which shows the proportion of patients with lower MIC depending on the rate of reperfusion experiencing major events



CONCLUSIONS

- 1. Identifying the patients for whom every effort must be made to transfer them for primary percutaneous coronary intervention, is possible by using ECG patterns of patients with evolving myocardial infarction or clinically established. This observation justifies reviewing ECG information given in cases of acute STEMI. Patterns of patients with evolving myocardial infarction and those clinically established probably should be incorporated in the risk assessment procedure in cases of STEMI and may be included in randomized algorithms for clinical research setting and prognosis in STEMI results.
- 2. Reperfusion can be achieved by fibrinolytic therapy or primary coronary intervention. There has not been reached any consensus, such as all patients should receive an invasive strategy. Moreover, most patients are treated in hospitals without cardiac catheterization facilities within 24/7 days and the decision of optimal reperfusion therapy is hampered by the lack of clear criteria as a result of the lack of consensus regarding the application of fibrinolytic therapy or coronary intervention.

REFERENCES

- Bassand JP, Hamm CW, Ardissino D, Boersma E, Budaj 1. A, Fernandez-Aviles F, Fox KA, Hasda D, Ohman EM, Wallentin L, Wijns W, ESC Committee for Practice Guidelines (CPG), Vahanian A, Camm J, De Caterina R, Dean V, Dickstein K, Filippatos G, Kristensen SD, Widimsky P, McGregor K, Sechtem U, Tendera M, Helleman s I, Gomez JL, Silber S, Funck-Brentan o C, Kristensen SD, Andreotti F, Benzer W, Bertrand M, Betriu A, De Caterina R, DeSutter J, Falk V, Ortiz AF, Gitt A, Hasin Y, Huber K, Kornowski R, Lopez- Sendon J, Morais J, Nordrehaug JE, Silber S, Steg PG, Thygesen K, Tubaro M, Turpie AG, Verheugt F, Windecker S, Task Force for Diagnosis and Treatment of Non-ST-Segment Elevation Acute Coronary Syndromes of European Society of Cardiology (2007): Guidelines for the diagnosis and treatment of non-ST- segment elevation acute coronary syndromes. The task force for the diagnosis and treatment of non-ST-segment elevation acute coronary syndromes of the European society of cardiology. Eur Heart J. 28:1598-1660.
- Thygesen K, Alpert JS, White HD and Joint ESC/ACCF/AHA/WHF Task Force for the Redefinition of Myocardial Infarction Task Force Members (2007): Universal definition of myocardial infarction. Eur Heart J. 28:2525-2538.
- Wagner GS and Lim TH. Increased myocardial demand. In: Marriot's practical electrocardiography, pp. 153-162. Ed. Wagner GS, Lippincott Williams & Wilkins, Philadelphia, USA; 2010.

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