Characterization of patients with myocardial infarction with non-obstructive coronary arteries – experience from the Croatian branch of the ISACS-CT Registry

Ines Vinković[1]*,

Filip Lončarić[2],

Petra Mjehović[1],

Dorja Sabljak[3],

Vedrana Vlahović[3],

Grgur Salai[3],

Klara Klarić[3],

Toni Radić[3],

Saša Pavasović[1],

Nina Jakuš[1],

Dora Fabijanović[1],

Ivo Planinc[1],

Maja Čikeš[1],

Davor Miličić[1]

[1]University of Zagreb School of Medicine, University Hospital Centre Zagreb, Zagreb, Croatia

[2]August Pi i Sunyer Biomedical Research Institute (IDIBAPS), Barcelona, Spain

[3]University of Zagreb School of Medicine, Zagreb, Croatia

Background and Aim: There are still wide knowledge gaps in myocardial infarction with non-obstructive coronary arteries (MINOCA) - a heterogeneous entity seen in 1-10% of patients with acute coronary syndrome (ACS)[1]. The aim is to determine characteristics of MINOCA in the Croatian branch of the ISACS-CT registry, and compare them to age- and gender-matched patients with unstable angina (UA), non-ST-segment elevation myocardial infarction (NSTEMI) and ST segment elevation myocardial infarction (STEMI).

Patients and Methods: The study included 2487 patients with ACS. MINOCA was defined by simultaneous cardiac troponin levels >0.014 ng/L, symptoms of ischemia or significant ST-T changes in the ECG, and an absence of coronary artery stenosis of ≥ 50% on angiography. Age and gender-matching was performed from the remaining cohort by randomly sampling patients from the UA, STEMI and NSTEMI subgroups, based on the mean age ± 5 years and the gender ratio of the MINOCA group.

Results: MINOCA was seen in 2.5% (n=63) of the cohort, initially categorized as UA (37%), NSTEMI (48%) and STEMI (16%). Median age was 62 (53, 71) years, 56% male. After age- and gender-matching, there were 36 UA (10% of the UA cohort), 135 NSTEMI (15%) and 198 STEMI (16%) patients in the ACS control subgroups. MINOCA patients had a lower prevalence of diabetes, hypertension, dyslipidemia, chronic kidney disease and tobacco use as compared to UA and NSTEMI. MINOCA patients used less antiplatelets, beta-blockers and statins before hospitalization. MINOCA and STEMI subgroups had a high incidence of chest pain symptoms and a short time from symptom onset to hospitalization. In the first 24h of hospitalization, less MINOCA patients were treated with antiplatelets and statins, and at discharge, they were less frequently prescribed with antiplatelet drugs compared to UA and NSTEMI (**Table 1**). In-hospital mortality was low, with no deaths in MINOCA and UA patients, and 2 and 3 deaths in NSTEMI and STEMI, respectively.

Conclusion: MINOCA patients are mainly categorized as UA and NSTEMI at presentation, but have less comorbidities, more pronounced symptoms of typical chest pain, a shorter time from symptoms to hospitalization, lower levels of statin and antiaggregation prescription at admission, and antiaggregation at discharge. In-hospital mortality confirms MINOCA as low risk, however, long-term registry follow-up is needed to learn about longer term outcomes.

TABLE 1. Baseline characteristics and the comparison of patients with myocardial infarction with non-obstructive coronary arteries, unstable angina, ST-segment elevation myocardial infarction and non-ST-segment elevation myocardial infarction.

	VARIABLES	MINOCA (n=63)	UA (n=36)	NSTEMI (n=135)	STEMI (n=198)	P-value	Misssing
ACS type	UA	37	-	-	-		0
	NSTEMI	48	-	-	-		0
	STEMI	16	-	-	-		0
General characteristics	Age	62	60	62	62	0.692	0
	Male gender	56	56	56	56	1	0
	BMI	28.7	31.2	29.3	27.7	**0.001**	36
	Systolic blood pressure at admission	145	150	140	140	**0.003**	20
	Family history of CAD	27	31	31	26	ns	0
	Diabetes	18	28	36	23	**0.017**	0
	Insulin therapy	2	8	11	7	0.087	0
	Hypertension or on th	77	92	82	76	0.118	1
	Smoking or ex-smoker	36	56	42	62	**<0.001**	6
	Hypercholestroleamia or on therapy	58	86	69	53	**<0.001**	5
	Angina classified by CCS	7	13	14	5	0.057	13
	Unstable angina at rest	8	49	11	2	**<0.001**	8
	Heart failure NYHA 2+	5	3	3	2	0.412	7
	COPD	2	6	6	7	0.539	7
	Chronic kidney disease	5	12	12	4	**0.028**	7
Theraphy before admission	Aspirin	35	43	32	18	**0.002**	6
	Other antiplatlet therapy	18	24	10	6	**0.006**	8
	ACEi	49	57	47	40	0.249	6
	Beta-blockers	44	49	41	22	**<0.001**	6
	Statins	30	39	32	18	**0.007**	6
ACS presentation	Two or more 20 mins chest pain episodes in the previous 24 hrs	21	48	50	41	**0.014**	33
	Onset <6 hours	63	44	46	70	**<0.001**	3
	Chest pain	97	92	90	98	**0.004**	1
	Abnormal ECG	46	46	63	99	**<0.001**	1
	LBBB	4	0	1	5	0.514	6
	ST elevation	19	6	4	81	**<0.001**	0
	ST depression	10	14	22	15	0.147	0
	Q wave	5	11	8	15	0.074	0
	T wave inversion	3	17	26	10	**<0.001**	0
	Initial descision for PCI treatment	63	83	86	99	**<0.001**	0
Therapy at admission	Nitrates	45	57	47	34	**0.021**	10
	Aspirin 24h	100	100	96	96	0.394	2
	Clopidogrel	71	86	90	69	**<0.001**	2
	Other antiplatelet therapy	10	9	13	46	**<0.001**	3
	Statins 24	84	97	95	95	**0.030**	1
	ACEi 24h	82	86	74	71	0.127	3
	Beta blockers 24h	76	81	75	66	0.122	2
	GP IIb/IIIa	3	12	10	50	**<0.001**	7

TABLE 1. Continued.

	VARIABLES	MINOCA (n=63)	UA (n=36)	NSTEMI (n=135)	STEMI (n=198)	P-value	Misssing
Lab results	Troponin T	0.07	0.02	0.18	0.35	**<0.001**	15
	Troponin T peak	0.2	0.04	0.7	3.64	**<0.001**	25
	CRP	2	38	30	25	**0.001**	35
	CRP-peak	4	39	33	58	**0.005**	52
	Creatinemia	90	88	90	80	**0.024**	5
	WBC	7.5	8.9	9.0	11.3	**<0.001**	5
	Hemoglobin	139	143	140	141	0.606	5
	Cholesterol	4.7	5.1	5.2	5.0	0.419	15
	Tryglicerides	1.28	1.61	1.63	1.40	**0.001**	15
	HDL-C	1.3	1.17	1.10	1.17	**0.003**	15
	LDL-C	2.87	3.68	3.71	3.68	0.322	15
	Kaliemia	4.2	4.3	4.3	4.1	**0.020**	19
	Na	140	140	140	139	**<0.001**	21
	CK peak	207	161	165	1229	**<0.001**	42
Theraphy at discharge	Aspirin at discharge	94	100	97	96	0.446	0
	Clopidogrel at discharge	44	89	87	54	**<0.001**	0
	Other antiplatelet therapy at discharge	0	8	8	47	**<0.001**	1
	Anticoagulants at discharge	21	11	7	18	**0.012**	0
	ACEi at discharge	81	81	81	81	ns	1
	Beta-blockers at discharge	79	81	84	80	0.804	0
	Statins at discharge	89	97	95	94	0.360	1
	Other lipid lowering drugs at discharge	3	6	12	8	0.202	0
	Diuretics at discharge	24	36	28	27	0.624	2
	Antiarrhythmics at discharge	18	17	12	8	0.533	2
Outcomes	Duration of hospitalisation	4 (2, 5)	3 (2, 5)	4 (3, 7)	5 (1, 7)	**0.005**	0
	EF at discharge	55	60	55	50	**<0.001**	22
	Hospital mortality	0	0	2	3	0.573	0

MINOCA - Myocardial infarction with non-obstructive coronary arteries; UA - Unstable angina; STEMI - ST-segment elevation myocardial infarction; NSTEMI - Non-ST-segment elevation myocardial infarction; ACS - Acute coronary syndrome; BMI - Body mass index; CAD - Coronary artery disease; CCS - Canadian Cardiovascular Society; NYHA - New York Heart Association; COPD - Chronic obstructive pulmonary disease; ACEi - Angiotensin-converting-enzyme inhibitor; ECG – Electrocardiogram; LBBB - Left bundle branch block; GP IIb/IIIa - Glycoprotein IIb/IIIa; WBC - White blood cells; EF - Ejection fraction

LITERATURE ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||

1. Agewall S, Beltrame JF, Reynolds HR, Niessner A, Rosano G, Caforio AL, et al; WG on Cardiovascular Pharmacotherapy. ESC working group position paper on myocardial infarction with non-obstructive coronary arteries. Eur Heart J. 2017 Jan 14;38(3):143-153. https://doi.org/10.1093/eurheartj/ehw149