



# POSTERS



## Impact on microcirculation in early versus late invasive approach in patients with pharmacological reperfused STEMI

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Interventional reperfusion is now the treatment mainstay in patients with STEMI and ongoing ischemia. However, in reperfused patients, present guidelines recommend that coronary angiography should be performed in the first 24h, but there is no mention of the PCI timing. A benefit from delayed PCI could be gained because of the reduced thrombus burden and plaque stabilization after prolonged medical therapy, with less subsequent microcirculation embolisation and no-reflow. We compared the angiographic parameters of the early – PCI strategy (<24 hours) with the late PCI strategy after successful fibrinolysis in STEMI patients regarding clinical and angiographical parameters.

We found 1995 patients in our local STEMI registry between 2012 and 2015, of which 365 received fibrinolysis. Reperfusion criteria on arrival in our centre were found in 189 patients. The angiograms were reanalyzed independently by two local experts. Angiographic parameters regarding the TIMI flow and thrombus burden were gathered.

The early invasive group is made up of 150 patients (71,8%). There were no significant differences between the baseline characteristics of the two groups. The mean time until the coronary angiogram was 0,81h in the early group and 139,5h in the late group. More PCIs were performed in the early group (66,9% vs 60,0%;  $p=0.3$ ). Significantly more patients had TIMI 0 in the early group (17,2% vs 4%;  $p = 0.01$ ). There was a significantly larger thrombus burden quantified by the TIMI thrombus grading scale in the early group (1.73 vs 0.7,  $p<0.001$ ). There was a trend towards more post PCI TIMI2 flow in the early group (19,3% vs 10,0%;  $p=0.2$ ) but significantly less TIMI 3 flow (73,1 vs 90,0%;  $p = 0.05$ ).

Early coronary angiogram is mandatory because of poor reliability of noninvasive criteria. Delayed PCI after successful fibrinolysis appears to be a safe method, with the benefit of a significantly better final TIMI flow. The significantly lower thrombus burden leads to a better PCI outcome. A prospective study is required.

## Rosuvastatin improves cutaneous microcirculation by mechanisms beyond lipid lowering

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Microcirculation is an important part of circulatory system and can be assessed by laser Doppler flowmetry (LDF). Recent studies have shown that statins exert a variety of pleiotropic (cholesterol-independent) effects. However, the effect of statin therapy on microcirculation is not yet established. The purpose of this study was to investigate whether rosuvastatin can improve skin microcirculatory function.

This was an open-label single-group study in patients with established coronary artery disease (CAD), who did not receive lipid-lowering therapy for 4 weeks. Patients with hypertension and diabetes were excluded. 28 patients (22 male; mean age  $56 \pm 7.41$  years) received rosuvastatin 10 mg daily for 12 weeks. At baseline and after 12 weeks of rosuvastatin treatment all patients underwent LDF with amplitude-frequency wavelet analysis of skin blood flow oscillations. Microcirculatory parameters included tissue perfusion level and vasomotion amplitudes. Vasomotion amplitudes were assessed using maximum values (Amax) in the corresponding frequency band for endothelial (Ae), neurogenic (An), myogenic (Am), venular (Av) and cardiac (Ac) sections of blood flow modulation.

At 12 weeks of rosuvastatin therapy, only 2 (7%) patients achieved target LDL-cholesterol levels  $< 1.8$  mmol/l. However, LDF demonstrated significant increase in tissue perfusion level from  $4.8 \pm 1.9$  to  $5.6 \pm 2.1$  AU ( $p < 0.01$ ). Additionally, there was significant increase in the amplitude vasomotion of Ae (from  $0.17 \pm 0.16$  to  $0.28 \pm 0.16$  AU,  $p < 0.05$ ), An (from  $0.25 \pm 0.11$  to  $0.28 \pm 0.24$  AU,  $p < 0.05$ ) and Am (from  $0.14 \pm 0.11$  to  $0.22 \pm 0.15$  AU,  $p < 0.05$ ) corresponding to a decrease in endothelial, neurogenic (sympathetic) and myogenic tone of precapillary arterioles.

Although in our study only 7% patients achieved LDL-C target level, rosuvastatin significantly improved cutaneous microcirculation in all patients with CAD. These findings indicate the beneficial effect of rosuvastatin therapy on microcirculation by mechanisms independent of lipid-lowering.

## Hypertension and coronary artery disease impact in current risk evaluation of peripheral artery disease

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Evaluation of hypertension and coronary artery disease impact in current risk of peripheral artery disease (PAD) and validation of PAD score for its subsequent use in practice and early detection of PAD in symptomatic or asymptomatic patients.

The prospective study included 1600 patients admitted in the 2nd Department of Internal Medicine and Department of Cardiology of the Clinical Emergency Hospital "Sfântul Spiridon" Iasi, enrolled consecutively between August and November, 2016. Patients were divided into 2 groups: asymptomatic and symptomatic (intermittent claudication). PAD score (Duval S., et al., Vasc Med, 2012) was applied and ankle-brachial index (ABI) was performed to patients. The score included the following items: age, sex, race, diabetes, body mass index (BMI), hypertension, smoking, heart failure (HF), coronary artery and cerebrovascular diseases.

The group included 43.19% male and 56.81% female, 60.31% with hypertension (more than half had stages 2 and 3) and 37.19% with coronary artery disease. Other assessed risk factors were: BMI >25 kg/m<sup>2</sup> in 80.63% (overweight – 45.88%, obesity class I – 27.50% and obesity class II-III – 7.25%), HF in 33.88%, smoking in 30.13%, diabetes in 18.58% and cerebrovascular diseases in 10.5% of the patients. All symptomatic patients with a specified diagnosis of PAD had a strong association with high risk PAD score ( $p < 0.0001$ ). Patients with ABI < 0.9 with individual risk factors (gender, age, smoking, obesity, HF, coronary artery and cerebrovascular diseases) have not recorded significant associations, only hypertension has moderate association ( $p < 0.0001$ ). The combination of two (hypertension with smoking or HF) risk factors had moderate significance, whereas three (ex. hypertension with smoking and HF or CAD with smoking and diabetes) risk factors had a strong significant association ( $p < 0.0001$ ).

Study of the PAD current risk using the PAD score revealed patients in the subclinical and clinical stages of this disease, results being statistically significant.

## Particularities of arterial function in hypertensive patients with metabolic syndrome (MS)

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Hypertension is associated with increased arterial stiffness, a mechanism that explains the development of cardiovascular events in this category of patients. The measurement of pulse wave velocity, the gold standard of arterial stiffness, was included in the European guidelines for the treatment of hypertension, being considered an independent predictor of cardiovascular events.

We aimed to investigate arterial stiffness in hypertensive patients with metabolic syndrome compared to those without MS.

The study included 148 hypertensive patients, with a mean age of  $61.5 \pm 9.9$  years, of which 62.8% (93) women. According to IDF criteria, 117 of all patients (79.1%) had metabolic syndrome. Arterial function parameters: pulse wave velocity and the augmentation index were assessed with the TensioMedTMArteriograph.

Regarding pulse wave velocity, there were no statistically significant differences between women and men with hypertension (PWVAo: 10.62 m/s vs 10.41 m/s, pNS); in contrast, both the brachial augmentation index and the aortic augmentation index showed statistically significant differences in hypertensive women compared to men (Aixb 12.60 vs -6.23,  $p < 0.0001$ , AixAo 43.34 vs 34.13,  $p < 0.0001$ ).

The analysis of arterial parameters in hypertensive subjects with metabolic syndrome vs hypertensive patients without metabolic syndrome evidenced: a statistically significant difference only for the brachial augmentation index ( $3.01 \pm 28.6$  vs  $15.3 \pm 33.3$ ,  $p = 0.04$ ); no statistically significant differences between the two groups regarding pulse wave velocity (PWVAo  $10.53 \pm 1.8$  vs  $10.59 \pm 2.33$ ; pNS) and the aortic augmentation index ( $38.7 \pm 14.6$  vs  $44.2 \pm 16.6$ ,  $p = 0.07$ ).

Regarding clinical and biological parameters, Aixb and AixAo were correlated with systolic BP (correlation coefficient  $r = 0.99$ ,  $p < 0.0001$ ), diastolic BP ( $r = 0.18$ ,  $p = 0.02$ ), total cholesterol ( $r = 0.17$ ,  $p = 0.03$ ), HDL cholesterol ( $r = 0.38$ ,  $p < 0.0001$ ), abdominal circumference ( $r = 0.4$ ,  $p < 0.001$ ), and were not correlated with LDL cholesterol, triglycerides and glycemia. Pulse wave velocity was correlated with systolic BP

( $r=0.3$ ,  $p<0.001$ ), triglycerides ( $r=0.16$ ,  $p=0.04$ ), total cholesterol ( $r=0.18$ ,  $p=0.02$ ), and was not correlated with diastolic BP, glycemia, HDL and LDL cholesterol, BMI or abdominal circumference.

Hypertensive subjects have accelerated atherosclerosis due to early arterial stiffness, with an alteration of arterial function parameters (pulse wave velocity, aortic and brachial augmentation index), particularly in the presence of metabolic syndrome.

## Microvascular dysfunction in chronic coronary artery disease

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The coronary microcirculation is indispensable for supplying and regulating blood flow in order to match oxygen demand and supply to the myocardium.

The vascular endothelium is responsible for important functions, including regulation of capillary permeability, vascular tone and blood flow. The endothelium has a dual role in the control of vascular tone by segregating, in response to hemodynamic and chemical stimuli, both vasodilatory substances such as nitric oxide [NO] and prostacycline and vasoconstrictive substances endothelin-1 [ET-1] and angiotensin II [AT-II].

Any imbalance between vasodilatating and vasoconstricting factors lead to endothelial dysfunction, a condition with systemic implications and associated with morbidity and mortality.

There are a variety of causes that may contribute to endothelial dysfunction like traditional risk factors: hypertension, hyperlipidemia, diabetes, smoking, or non traditional risk factors: chronic inflammation, hiperhomocysteinemia, metabolic syndrome, renal disease, left ventricular hypertrophy, anemia, infection.

A finding of angina with a normal arteriogram may occur both, in the setting of a chronic (stable) or an acute (unstable) angina syndrome. Microvascular function is frequently impaired in ACS especially in STEMI. It is uncertain whether this is a contributor or a consequence of the ACS. It may be to a large extent endothelial independent, due to thrombi and debris embolization, myocardial edema and other factors.

Epicardial vascular function can be assessed by non-invasive evaluation: PET (gold standard for measurement of myocardial blood), echo (transthoracic or transesophageal) -Doppler quantification of blood flow (mostly on LAD) preferably with US contrast enhancement - CFR, SPECT, CMR or invasive with angiography (blush, TIMI frame count), Doppler wire CFR, myocardial resistance( Index of Myocardial Resistance)

All patients with endothelial dysfunction should achieve optimal coronary risk factors control. There is no specific cure. Symptomatic treatment is empirical because of the limited knowledge of its causes and the lack of conclusive therapeutic trials.



## Later complication of an acute myocardial infarction

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The myocardial rupture is a pathology with high mortality unless early diagnosed with emergency surgical treatment. Myocardial rupture may occur in the setting of acute myocardial infarction, cardiac trauma, primary cardiac infection, tumors, infiltrative diseases of the heart, aortic dissection but may also occur iatrogenically during percutaneous cardiac procedures or open heart surgery. Risk factors for myocardial rupture after STEMI include the following: relatively small first anterior myocardial infarction (AMI), female sex, age older than 60 years, hypertension, postinfarction angina, late thrombolysis (>11 hours), use of NSAID or steroids during the acute phase of AMI, elevated peak serum C-reactive protein levels.

We present the case of a 77 years old female with cardiovascular risk factors (arterial hypertension, obesity), effort angina that presents to the ER with anterior STEMI, with thrombolysis after 6 hours from the pain onset with reperfusion criteria. 9 hours after the pain onset the patient arrives to the cath lab and the coronarography reveals tight stenosis of the medium segment of the LAD.

The revascularisation of the LAD was decided. Because of the tight stenosis the use of a balloon is required before stent implantation with a TIMI 1-2 flux result. The slow-flow required intravascular thromb aspiration and administration of intracoronary nitroglycerine with good angiographic result and at the end of the procedure the patient was hemodynamically stable, without angina. Few hours after the procedure the patient presents cardiorespiratory arrest with electromechanical dissociation, echocardiographically with circumferential large amount of pericardial fluid with absent mechanical activity despite the electric activity and the exitus is declared.

The slow coronary flow phenomenon is a systemic phenomenon caused by microvascular dysfunction with higher incidence in patients presenting hypertension, low HDL-C, high BMI. Elderly patients with acute myocardial infarction are at increased risk of developing complications, they have an increased risk of bleeding with thrombolytic therapy and they should undergo primary angioplasty if available. Myocardial rupture complicates as many as 10% of STEMI cases, affecting mostly the females. Myocardial rupture is responsible for nearly 10% of all in-hospital deaths among patients with STEMI.

## Predictive value of N-terminal-pro-brain natriuretic peptide in the development of heart failure with preserved ejection fraction

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Measurement plasma level of N-terminal-pro-brain natriuretic peptide (NT-proBNP) is a reliable prognostic factor in patients with heart failure (HF), It offers a significant advance in the diagnosis and treatment of heart failure. However it is unclear how differently the biomarker predicts adverse outcomes in HF with preserved EF (HFpEF). Aim of our study was to evaluate the prognostic value of NT-proBNP in the development of heart failure symptoms with preserved EF in patients with acute coronary syndrome-ACS. n=50 patients with acute coronary syndrome admitted to our coronary care units were enrolled in our research. We used diagnostic methods, such as: Resting ECG, determination of cardiacTroponin I level (cTnI), measurements of NT-proBNP, we also measured CK-MB and performed echocardiography measurement of EF. NT-proBNP and EF measurement we performed also during follow up: 1-3 months later after the hospital discharge. According our results totally NT-proBNP was elevated in 36% (n=18) of hispitalized patients who had not symptoms of heart failure and were hispitalized because of ACS (STEMI and NSTEMI). EF<54% was seen just in n=8 patients who had elevated level of NT-proBNP. All these patients were investigated after 1-3 months from hospital discharge. In our study group we had not no one case of patient death. From the group with elevated level of NT-proBNP seven patients (38,8%) had recurrent ischemic events (2 subsequent MI, 5 recurrent angina), and 11 (61%) had ymptoms of heart failure (NYHA II-III). n=9 patients developed heart failure symptoms with preserved EF. We couldn't find correlation between NT-proBNP and decreased EF during hospitalization, but correlation revealed between NT-proBNP elevated level and decreased EF(ejection fraction )  $p<0.005$  in STEMI group during follow up. Such kind of correlation wasn't found in NSTEMI group  $p<0.007$ . Our results suggest that NT-proBNP levels, measured at admission can have predictive value for development of heart failure symptoms with preserved EF (HFpEF) and with reduced EF (HFrEF). Measurement of this marker at early stage of hospitalization is easy and simple way to predict short-term complications and avoid them.

## Renal dysfunction is associated with higher myocardial perfusion pressure in hypertensive patients

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Impaired creatinine clearance (CrCl) is associated with a lower incidence of positive fractional flow reserve (FFR) values, possibly because of the microvascular dysfunction associated with chronic kidney disease, but the exact mechanism is unknown. Myocardial perfusion pressure (MPP), an important determinant of coronary microvascular function, is mainly depending on systemic diastolic blood pressure (DBP). The objective of the present study was to evaluate the influence of aortic diastolic pressure changes on MPP in hypertensive patients with and without impaired creatinine clearance.

Aortic and distal coronary diastolic pressure values were determined in maximal hyperemia in 96 consecutive hypertensive patients referred for FFR measurement because of intermediate severity coronary artery lesions. Distal coronary DBP was considered the MPP. The creatinine clearance was estimated on the basis of the pre-procedural creatinine value, using the Modification of Diet in Renal Disease (MDRD) formula.

In the studied patients ( $62 \pm 8.9$  years, 66.67% male, 29.17% with diabetes), positive FFR values ( $<0.8$ ) were found in 48.96%. The mean CrCl was 82 ml/min/1.73m<sup>2</sup>. The incidence of positive FFR values was significantly lower below this value (37.78% vs. 58.82%,  $p=0.04$ ). For decreasing hypothetical values of aortic DP, MPP values changed more rapidly in case of higher CrCl values. Accordingly, if aortic DP were 50 mmHg, 31.1% vs. 52.9% of patients with and without CrCl  $<82$  ml/min/1.73m<sup>2</sup> would have had a MPP  $<39$  mmHg, corresponding to an absent coronary blood flow ( $p=0.03$ ). Conversely, at hypothetical aortic DP values  $\leq 60$  or  $\geq 40$  mmHg, the MPP values were identical in the two groups.

In hypertensive patients, impaired renal function is associated with significantly higher myocardial perfusion pressure in certain haemodynamic circumstances, suggesting a higher microvascular resistance in these patients. This partially explains the lower incidence of positive FFR measurements in case of kidney dysfunction.

## A “broken heart”, a chimera of the acute coronary syndromes?

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Takotsubo cardiomyopathy (TCM), also called transient left ventricular (LV) apical ballooning or “broken heart syndrome,” is a cardiac condition that mimics the clinical presentation of acute coronary syndrome (ACS), but without any evidence of obstructive atherosclerotic coronary artery disease. Proposed etiopathogenetic mechanisms include: multivessel coronary artery spasm, impaired cardiac microvascular function, and endogenous catecholamine induced myocardial stunning and microinfarction.

We report the case of a 77 years old female patient, with medical history of hypertension, admitted in our emergency unit at two hours after the onset of an intense chest pain, associated with shortness of breath, occurred in conditions of a major emotional stress (unexpected loss of a son). The electrocardiogram showed ST segment depression in precordial leads and deep T-wave inversions in both anterior and inferior leads, with positive finding of cardiac troponin I. The echocardiography showed severe impaired LV systolic function (estimated ejection fraction of 20-25%), with severe hypokinesia of the apex and the mid-apical segments of the LV walls and also severe mitral regurgitation (MR), with eccentrically directed posterior jet. Surprisingly, coronary angiography showed no significant coronary artery lesions. Left ventriculography showed severe hypokinesia of the apex, outlining an image of LV “apical ballooning”, suggestive for TCM.

Under supportive medical treatment, the evolution was slightly favourable, with symptoms relief and without arrhythmic events until discharge. According to the initial cardiovascular surgical evaluation, the mitral valve repair procedure was delayed, due to severe LV systolic dysfunction. At 4 weeks follow-up, it was noticed a full recovery of LV function and mild MR at echocardiography, aspects that further sustained the diagnosis of TCM.

Although it was thought to be a quiet rare condition (up to 2% of ACS), in the daily clinical practice TCM should be considered on a patient presented as ACS without significant coronary artery lesions. This case underline an unexpected evolution of a critical patient, presented as acute myocardial infarction with severe LV dysfunction and acute ischemic MR, but with “normal” coronary arteries, that had instead an excellent recovery, typical for TCM.

## Impact of microcirculation in acute coronary syndromes in diabetic patients

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The aim of this study was to evaluate particularities of acute coronary syndromes (ACS) in patients with diabetes mellitus and in non-diabetic patients.

We studied 240 consecutives patients with ACS - angina with ST changes and positive troponin - in whom was performed CT angiocoronarography. There were 82 patients with "normal angios" that means with lesions less than 50%. We manage to identified 2 homogenous groups of patients with ACS: group I with diabetes mellitus and group II non-diabetic as control, aged and gender match, with no significant differences in comorbidities or risk factors – systemic hypertension, dislipidemia, obesity, kidney disease and smoking. All patients were treated according to guidelines.

non-diabetic patients developed less ACS without significant lesions of epicardial coronaries – patent coronary artery disease. In diabetic patients the incidence of ACS is higher even without coronary lesions in so-called „normal angios”. Before the acute event, medical treatment do not differ significantly : 72% vs. 71% received betablockers, 63% vs. 64% received ACEinhibitors or AT1 blockers, 91% vs. 91% antiagregants, 18% vs 19% anticoagulants, 36% vs. 35% metabolic antianginal agents. 72% of diabetic patients were on statins before the event vs. 56% non-diabetic patients ( $p=0,0021$ ). Patients with ACS and no significant lesions on CT angiocoronarography have more diabetes mellitus so the microcirculation alterations is involved. Even more diabetic patients were on statins before the event, the incidence of ACS was higher, suggesting that inflammation, specific metabolic alterations and not plaque instability are the main mechanism of disease.

Today, the crucial role of the coronary microcirculation in coronary perfusion is more and more recognized. Diabetes mellitus represents a special condition in alteration of coronary microcirculation and is responsible for acute ischemic events, coronary flow reserve decreases in the absence of coronary artery disease.

## Relationship between peripheral and coronary function using laser Doppler flowmetry and SPECT in patients with Microvascular angina

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Generalized abnormality in microvascular function and reduced coronary flow reserve has been reported in patients with microvascular angina (MVA). Cutaneous microvascular function may reflect the state of visceral microcirculation, therefore we examined laser Doppler flowmetry (LDF) forearm microvascular flow in compartment of exercise SPECT in MVA patients. To evaluate the relationship between peripheral and coronary function using LDF and SPECT in patients with MVA.

17 patients (16 women, 1 men) mean age 57[53;59] years with angina, positive exercise stress testing, and normal coronary angiogram were included in the study. Patients with diabetes, hypertension, autoimmune diseases, asthma and coronary spasm during the coronary angiography were excluded. Anti-anginal medication was discontinued for >5 drug half-lives before investigation. Patients underwent a three-phase  $^{99m}\text{Tc}$ -MIBI-SPECT scan: rest, exercise stress test (Ex-SPECT) and pharmacological stress with adenosine triphosphate infusion (ATP-SPECT). Images were evaluated by visual and automated analysis using a 17-segment model, obtaining total perfusion deficit (TPD), reversibility extent (Rev.Ext.). Skin microvascular function was assessed by LDF with the dilator (heating (HT), transcutaneous electrical stimulation (ET) and arterial occlusion (AOT)) tests on the ulnar part of the left forearm.

Myocardial perfusion abnormalities were revealed in all patients by SPECT. There were significant negative correlations between dilation reserve of skin microcirculation at the ET and TPD ( $r=-0,55$ ,  $p=0,02$ ) and Rev.Ext. ( $r=-0,6$ ,  $p=0,01$ ) by Ex-SPECT. Also, there were significant negative correlations between dilation reserve of skin microcirculation at the AOT and Rev.Ext. ( $r=-0,63$ ,  $p=0,005$ ) by Ex-SPECT. There were no correlation between LDF and ATP-SPECT.

Our results support the idea that peripheral measurements of skin blood flow represent the generalized microvascular function including that of the coronary microcirculation and may indicate the possible contribution of disturbances peptidergic sensory regulation of microvascular dysfunction in MVA.



## New perspectives of risk factors associated with LVH

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Left ventricular hypertrophy (LVH) is a independent cardiac risk factor that can be found in patients with high blood pressure. The aim of pur study was to establish the bond between LVH and glicated hemoglobin, body mass index, HDL-cholesterole and uric acid.

We realised a retrospective study on 495 hypertensive patients admitted in the Cardiovascular Rehabilitation Clinic from March to June 2016. From these, only 36 (7,27%) have LVH. Our patients were divided by the body mass index according to WHO (underweight – under 18,5 kg/m<sup>2</sup>, healthy weight - 18,5-24,99 kg/m<sup>2</sup>, overweight - 25-29,99 kg/m<sup>2</sup>, obese class I - 30-34,99 kg/m<sup>2</sup>, obese class II - 35-39,99 kg/m<sup>2</sup>, obese class III – over 40 kg/m<sup>2</sup>), glycated hemoglobin (normal – under 5,7%, prediabetes – 5,7-6,4%, diabetes – over 6,4%), uric acid ( low – under 2,3 mg/dl, normal 2,3-6,1 mg/dl, high – over 6,3 mg/dl), HDL-cholesterol (low – under 42 mg/dl, normal 42-88 mg/dl, high – over 88 mg/dl). The range used for our studied parameters was from our laboratory.

Diabetic patients with modified value of glycated hemoglobin have LVH, this being an independent risk factor. In addition, we observed that LVH is found in an almost identical statistical signifiante percent in overweighted and with a healthy weight patients while we can see a decrease in obese patients. Also, we found that HDL-cholesterol value is greater in patients with LVH than in patients with high blood pressure without LVH, with a statistical signifiante ( $p < 0,01$ ). In patients with high blood pressure without LVH, the uric acid value has the tendency of a directly proportional increase with the LVH value. The tendency is opposite in patients with high blood pressure and LVH. Furthermore, a tight correlation can be seen between hiperuricemia and cardiovascular risk factors it can be found in men.

In our study we demonstrated that LVH, glycated hemoglobin, body mass index and uric acid are independent risk factors for cardiovascular disease. The association of our studied parameters determines on one hand the increase of the cardiovascular disease risk and on the other hand, the removal of one risk factor decreases the morbi-mortality risk.

## Big heart broken by small vessels

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Microvascular angina is characterized by a decrease in coronary flow reserve with evidence of myocardial ischemia and without epicardial artery stenosis on coronary angiography.

We present the case of a 80-years-old female, hypertensive, dislipidemic patient who presented at the emergency department for epigastric and chest pain occurring at rest and lasting for 1 to 2 hours, never related to exercise. She had been symptomatic for two months and on initial evaluation ECG changes suggestive for infero-lateral subendocardial ischemia mandated coronary angiography which the patient refused. Endoscopy found mild gastritis and she was recommended proton pump inhibitors. Serial evaluations revealed mild normochromic normocytic normosideremic anemia (Hb 10-11 g/dl). The patient had moderate depressive disorder and was very anxious during chest pain episodes. On the current presentation, ECG shows ST-T wave changes similar to the ones described previously. During hospitalization, chest pain increased in frequency, intensity and duration and the cardiac biomarkers were now consistent with myocardial necrosis ( $>3\times$  upper limit). However, ecocardiography showed no changes in left ventricle kinetics and coronary angiography showed no significant coronary stenosis. A diagnosis of NSTEMI was made and the patient received antiplatelets, LMWH, beta blocker, high dose statin and nitrat therapy, along with pottent antidepressants. On this therapy there was no recurrence of chest pain and cardiac biomarker levels returned to normal levels.

The case was interpreted as a type 2 myocardial infarction in a female patient with multiple cardiovascular risk factors (age, hypertension, dyslipidemia) in whom a probable coronary endothelial dysfunction may have been worsened by the presence of anemia and sympathetic overdrive in the context of her psychiatric disorder.



## Microvascular coronary dysfunction – from concept to clinical practice. a case presentation

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We are presenting the case of a 56 years old women who was hospitalized for prolonged angina, transitory major left bundle branch block and ST-segment depression in anterior and lateral leads with negative T-waves in V1-V6 leads after the remission of conduction disturbance on ECG. Myocardial necrosis was diagnosed based on high levels of TnI. The patient was overweight, with uncontrolled arterial hypertension and dyslipidemia. Previous investigations for stable angina have revealed a positive exercise ECG test with normal coronary arteries on angiography. Current evaluations have indicated a mild concentric left ventricular hypertrophy and preserved ejection fraction on transthoracic echocardiography. Main causes of non-atherosclerotic acute coronary syndrome have been excluded (coronary spasm, transient coronary embolic phenomena or spontaneous coronary artery dissection) as long as the coronary angiography has confirmed the normality of epicardial vessels and transesophageal echocardiography had excluded embolic sources. After this acute event and the normalization of blood pressure and of the plasmatic lipid profile a dobutamine stress echocardiography was performed with monitoring of the left ventricular wall motions and the left anterior descending coronary artery (LAD) flow velocity. The results of this test have shown a microvascular coronary dysfunction: starting with 20 mcg/kg/min the patient has begun to present angina with horizontal ST-depression  $\geq 1$  mm in anterior leads on ECG associated with a blunted response of the LAD flow velocity (from 0.34 m/sec at baseline to 0.48 m/sec at 20 mcg/kg/min and 0.66 m/sec at 40 mcg/kg/min). We have chosen to present this case in order to underline the value of an investigation used mostly in the research field, like dobutamine stress echocardiography with evaluation of coronary flow velocity, in clinical setting. Based on this test we were able to find the correct cause of myocardial ischemia in a patient with normal epicardial coronary arteries, which is usually a difficult task for physicians. Moreover, we brought into attention a case of microvascular dysfunction with multiple ECG transitory abnormalities and an episode of acute coronary syndrome which is an uncommon evolution in this category of patients.

## Spectral analysis and dynamics of heart rate and blood pressure in hypertensive patients

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Hypertension represents an important condition that affects the adult population worldwide; it contributes significantly to morbidity and mortality from stroke, heart failure, coronary heart disease and renal failure. Although the pathogenesis of most hypertension is unclear, imbalance of the autonomic nervous system has been implicated in its development. Heart rate variability (HRV) has emerged as a practical, noninvasive tool to quantitatively investigate cardiac autonomic imbalance in hypertension.

In the study a beat-to-beat finger photoplethysmographic system (CardioVision 1.21.1; Meditech Ltd) for recording blood pressure waveforms has been used. Spectral analysis of blood pressure (BP) and heart rate (HR) fluctuations have been proposed as an unique approach to obtain a deeper insight into cardiovascular regulatory mechanisms in healthy subjects and hypertensive patients. Short term recordings of heart rate variability distinguish two main spectral components: a high-frequency (HF) component (ranging between 0.15-0.40 Hz), and a low-frequency (LF) component (ranging between 0.04-0.15 Hz), respectively considered markers of parasympathetic and sympathetic control. Autonomic influences are involved in the modulation of BP fluctuations, particularly at frequencies between 0.2 and 0.4 Hz [high frequency (HF) region or respiratory frequency] and around 0.1 Hz [mid frequency (MF) region].

The aim of our study was to highlight the complex heart rate modulation in hypertension and to analyze the entropy of RR intervals compared to normotensives subjects. The most important aspect of this study is that even in the early stages, the autonomic tone is involved in the complex mechanisms of regulation with consequences in the outcome of hypertensive patients.

## Microperfusion assessment using combined imagistic techniques in acute coronary syndromes

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Cardiovascular disease is the leading global cause of death, atherosclerosis being one of the main determinants of ischemic heart disease, affecting both major coronary arteries and coronary microcirculation. Our purpose is to assess the diagnostic value of resting myocardial contrast echocardiography (MCE) by demonstrating the correlation between results obtained with MCE, with other non-invasive imaging methods and coronary angiography.

We used multiple non-invasive imagistic methods to assess cardiac function in several patients, and we have randomly selected for exemplification one patient suffering an acute myocardial infarction 3 months before, and one control patient with cardiovascular risk factors but no ischemic heart disease. Left ventricle microperfusion quantification was evaluated by standard echocardiography, global longitudinal strain, MCE and myocardial scintigraphy with  $^{99m}\text{Tc}$ - tetrofosmin radiofarmaceutic. Coronary angiography was performed at presentation for all patients. We are looking forward to complete the study group.

For MCE we used as a contrast agent sulphur hexafluoride microbubbles enclosed in a phospholipid shell (Sonovue®); the microbubbles are entering the microcirculation highlighting the endocardial border. Quantitative perfusion parameters (peak intensity and time to peak) were analyzed using dedicated software.

In the case of the ischemic patient we obtained significantly lower peak intensity and higher time to peak compared to control, thus demonstrating myocardial microcirculation dysfunction.

Positive correlations were noted between kinetic parameters evaluated by standard echocardiography (SE), strain acquisitions, MCE, and myocardial scintigraphy - perfusion, regional motility and systolic wall thickening. Also, the results are concordant with perfusion status of coronary arteries as assessed by angiography.

Results obtained by MCE are correlated with the results obtained by standard echocardiography and by coronary angiography. Additionally, MCE brings useful information regarding myocardial microcir-

culatation. Accordingly, MCE can be used as a complementary non invasive technique for myocardial function and microperfusion assessment.

Keywords: microperfusion, acute coronary syndrome, echocardiography, myocardial scintigraphy

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## Retinal and cerebral microcirculation defects in hypertensive patients with cognitive impairment – case series

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Hypertension is the main modifiable risk factor for vascular brain injury, which is considered a sign of cerebral small vessel disease and an important mediator in the development of cognitive impairment and dementia.

The study objective was to present our experience of finding microvascular disease signs in hypertensive patients with mild cognitive impairment.

All hypertensive patients admitted after November 2016 to the Cardiovascular Rehabilitation Clinic in Tirgu Mures, Romania, were screened for cognitive impairment. Patients with history of stroke and with severe depression were excluded (based on the short 13 item form of the Beck depression inventory). From 58 patients screened 10 patients were identified with mild cognitive impairment (score under 26 according to the Montreal Cognitive Asessment questionnaire, and a minimental score above 20 points). These patients were examined for retinal and cerebral microvascular disease signs. Retinal photographs were taken for macular region and optic nerve head with a Carl Zeiss Visucam 500 retinal camera, and a brain MRI was performed and analyzed according to standards for reporting vascular changes on neurimaging methodology. Average age of studied patients was 73.7 years, hypertension grade 2 or 3. The frequency of the microvascular disease signs in these patients is presented in this study.

Retinal changes were present as follows: arteriovenous crossing sign present in 7 patients, silver or copper wire sign in 5 patients, widening of arteriolar reflex in 3 patients, constricted or tortuous arterioles in 5 patients, hard exsudates in 2 patients, cotton wool spots in 1 patient. Brain MRI identified white matter hyperintensities in all patients, lacunes in 7 patients, dilated perivascular space in 5 patients, recent small subcortical infarct in 3 patients, and cerebral microbleeds in none of the patients. 3 patients were diagnosed with sequelae of a neurologically asymptomatic cerebral infarct.

Patients with mild cognitive impairment have signs of retinal and brain microcirculation defects. Detection of cognitive impairment could be part of the routine workup of hypertensive patients, and may denote a high probability of microcirculatory defects in the brain. Further studies are needed to verify this hypothesis.

## Hypertension impact on myocardial longitudinal strain assessed by pharmacologic stress echocardiography in patients with anterior thoracic pain and normal coronary arteries

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Management of patients with anterior thoracic pain and normal coronary arteries is a challenge. Classic, to highlight the microvascular angina it must be fulfilled the triad: typical effort angina, ECG stress test or a positive imagistic stress test, and permeable coronary artery.

The objective of our study is to highlight the impact of hypertension on the myocardial strain under stress echocardiography in patients with normal epicardial coronary arteries but with anginal symptoms.

We evaluated myocardial deformation using global longitudinal strain expressed through SLG18 segments by using pharmacological stress echocardiography at rest then at the maximum load of 40 mcg/Kg/min and recovery phase. We selected patients with thoracic pain at presentation but with permeable coronaries at coronary angiography assessment.

The group of patients included 44 patients with mean age 54 years (9.5 years standard deviation), 52% women, 48% men; 70% hypertensive patients, and 16% with thoracic pain. Analyzing data obtained from stress echocardiography we obtained the following results:

In the rest phase there were no significant differences between hypertensive patients and non hypertensive patients ( $p < 0.05$ ).

At the maximum load of 40 gamma we observed an alteration of longitudinal strain in the hypertensive versus non hypertensive patients ( $p < 0.01$ ), the more pronounced deterioration in patients who have angina.

Although at the resting phase there were no notable differences of myocardial strain with load increasing, the stress echocardiography is able to reveal alterations of global longitudinal strain, among hypertensive patients. Hypertension induced changes may be explained by impaired coronary microcirculation.

## ST-segment elevation myocardial infarction in hypertensive patients. A paradox of high incidence, but lower mortality

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Arterial hypertension is one of the strongest risk factors for coronary artery disease, including ST-segment elevation myocardial infarction (STEMI). Data on the prognostic role of preexisting hypertension in patients presenting with STEMI are controversial. We aimed to evaluate the impact of hypertensive status on in-hospital complications and mortality rates in STEMI patients.

We evaluated data from 428 consecutive patients admitted for STEMI. In-hospital STEMI-related complications and mortality rates were assessed and compared between patients with and without a history of arterial hypertension.

A history of arterial hypertension was present in 70.8% of STEMI patients. Hypertensive patients were younger ( $p<0.01$ ), less likely to be active smokers ( $p<0.01$ ), but more likely to also have diabetes mellitus ( $p<0.01$ ). Hypertensive status was associated with longer hospital stay (8 (7-10) days vs. 8 (7-9) days,  $p=0.01$ ), but with significantly lower use of inotropic agents (10.7% vs 19.8%, OR 0.48 (95%CI 0.27-0.86),  $p=0.02$ ), lower incidence of asystole (4.1% vs. 9.7%, OR 0.39 (95%CI 0.17-0.90),  $p=0.04$ ), and lower in-hospital mortality rates (5.1% vs. 11.3%, OR 0.41 (95%CI 0.20-0.90),  $p=0.03$ ). In multiple regression analysis including age, smoking status, history of diabetes mellitus, as well as Killip class at hospital admission and GRACE score, hypertensive status remained an independent predictor of lower in-hospital mortality ( $p=0.01$ ), whereas age, smoking status, and diabetes mellitus did not (all  $p>0.05$ ).

Despite this high prevalence of arterial hypertension among STEMI patients, a 'hypertension paradox' was noted, with lower in-hospital STEMI-related hemodynamic complications and mortality rates among the hypertensive patients. The substrate of this finding, that does not seem to rely on the younger age or the less likelihood of smoking of hypertensive patients, remains to be established.

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## Diagnostic value of Adenosine triphosphate stress test $^{99m}\text{Tc}$ -MIBI single-photon emission computed tomography in patients with Microvascular angina.

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**Purpose:** To evaluate the feasibility and usefulness of  $^{99m}\text{Tc}$ -MIBI-SPECT with intravenous adenosine triphosphate (ATP) infusion and exercise stress test (Ex) in detection of myocardial ischaemia in patients (pts) with microvascular angina (MVA).

Pts with angina, positive exercise stress testing and normal coronary angiogram were included in the study. Pts with diabetes, hypertension, autoimmune diseases, prior myocardial infarction and coronary spasm during the coronary angiography were excluded. Antianginal medication was discontinued for >5 drug half-lives before investigation. Pts underwent a three-phase  $^{99m}\text{Tc}$ -MIBI-SPECT scan: rest, exercise stress test and pharmacological stress with ATP infusion (0.16 mg/kg body weight per min for 5 min). Myocardial perfusion SPECT was analyzed using a 17-segment left ventricular model, obtaining the summed stress score (SSS), summed rest score (SRS) and the summed difference score (SDS). Total perfusion deficit was measured at stress and rest (sTPD, rTPD) and ischemic TPD (iTPD) was calculated from the difference sTPD and rTPD.

We evaluated 44 non-smokers pts (93% female, mean ages of  $51 \pm 9,2$  yrs). 40 pts completed ATP-SPECT, 32 - Ex-SPECT, and 28 of them had also ATP and Ex-SPECT. In 75% pts developed chest pain during ATP stress and in 25% of cases - during exercise ( $p=0,01$ ). Stress ECG showed ischemic changes in 63%, whereas ATP stress ECG - in 53% of cases. Comparison Exercise stress/ATP stress SPECT images showed perfusion defects in 81% vs. 80% ( $p=n/s$ ), the mean SSS were 6[5;9] vs. 6[4;7] ( $p=n/s$ ), SDS - 5[4;7] vs. 4[3;5] ( $p=n/s$ ), sTPD - 7[5;11] vs. 7[6;8] ( $p=n/s$ ), iTPD 5[4;6] vs. 4,3[3;5,2] ( $p=n/s$ ) accordingly.

This study has shown that ATP stress  $^{99m}\text{Tc}$ -MIBI SPECT is comparable with exercise  $^{99m}\text{Tc}$ -MIBI SPECT in assessment of ischaemia and may be useful tool in detection of MVA.

# The severity of hemodynamic impairment at hospital admission can predict coronary microcirculation damage in ST-segment elevation myocardial infarction

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In up to 30% of patients undergoing primary percutaneous coronary intervention (pPCI) for ST-segment elevation myocardial infarction (STEMI), damage of the coronary microcirculation prevents restoration of normal blood flow to the cardiac myocytes despite restoration of epicardial coronary blood flow. This mechanism, reflected by the angiographic no-reflow phenomenon (NRP), has been associated with poor short- and long-term functional and clinical prognosis. We aimed to assess the ability of clinical, hemodynamic, and ECG markers on admission to predict NRP in patients undergoing pPCI for STEMI.

We evaluated data from 428 consecutive patients undergoing pPCI for STEMI. Clinical (presence of angina), hemodynamic (systolic, diastolic, and mean blood pressure, heart rate, left ventricular ejection fraction (LVEF), and Killip class) and ECG (number of ECG leads with ST-segment elevation, maximum ST-segment elevation, sum of ST-segment elevation, ECG localization of STEMI, presence of rhythm or conduction disorders) were obtained for all patients at hospital admission. Multiple regression analysis was used to identify independent predictors of NRP.

Angiographic NRP was observed in 23.56% of STEMI patients. Patients with NRP were older ( $p<0.01$ ) and presented longer symptom-to-balloon time ( $p=0.04$ ). Presence of angina and all ECG parameters were similar between patients with and without NRP (all  $p>0.05$ ). Killip class ( $p=0.02$ ) and heart rate ( $p<0.01$ ) on admission were significantly higher, whereas LVEF ( $p<0.01$ ) was significantly lower in patients with NRP. In multiple regression analysis including age and symptom-to-balloon time, higher heart rate ( $p<0.01$ ) and lower LVEF ( $p=0.03$ ) remained independent predictors of NRP.

The severity of hemodynamic impairment at hospital admission, as reflected by the high heart rate and low LVEF values, can predict coronary microcirculation damage after pPCI for STEMI. Besides its

prognostic potential, assessing hemodynamic status on admission in STEMI patients may be useful in guiding the therapeutic and pPCI approach.

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## Is resistant hypertension undoubtedly resistant?

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Resistant hypertension (RHT) is usually defined as high blood pressure values despite concomitant use of three antihypertensive agents in optimal doses, including one diuretic, and proper lifestyle methods. The exact prevalence of RHT is unknown, though indirect evidence from population studies and clinical trials suggest that it is a relatively common clinical finding. Consequently, management of RHT must begin with a careful evaluation to confirm the diagnosis and exclude factors associated with “pseudo-resistance,” such as secondary hypertension.

**Case report:** We report two cases, 55-years old man and 40-years old man, diagnosed with RHT, who were admitted to our clinic for investigations and treatment adjustments. Both patients complained of cephalalgia and fatigability. Complete blood count, plasma and urinary ionogram, 24-hour ambulatory blood pressure monitoring (ABMP), vascular Doppler ultrasonography, cardiac and abdominal ultrasonography were performed in both cases, with a median artery pressure of 175/94 mm Hg in the first case and 166/113 mm Hg in the second case, and no significantly target-organ damage. Additionally, both patients were tested for sleep apnoea and endocrine disorders. Primary hyperaldosteronism was detected in the first case and severe obstructive sleep apnoea in the second one. Adjusted treatment was started (spironolactone and continuous positive airway pressure, respectively). And repeated ABMP revealed controlled BP values.

Both patients are typical pseudo-resistant hypertension cases. Once again, it has been demonstrated that targeted investigation can reveal a secondary cause of HTA, with a high probability of BP lowering if appropriate treatment is started. These examples can restate that RHT is frequently over diagnosed and poorly investigated.

# The role of echocardiography in the study of myocardial deformation as a potential marker of impaired microcirculation in hypertensive patients

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Acute chest pain occurs frequently in hypertensive patients. Often, the coronary angiography does not confirm coronary disease despite the presence of the typical angina and ECG or echocardiography changes. In these cases, symptoms may be explained by impaired coronary microcirculation with consequences to the myocardium. We aimed to establish the presence of the global longitudinal strain alteration as a potential marker of impaired microcirculation in this subset of patients.

We studied the myocardial deformation using the speckle tracking echocardiographic techniques in a cohort of patients presented with acute chest pain, hemodynamically stable, without criteria of STEMI/NSTEMI and without an obvious non-ischemic cause. All patients underwent coronary angiography to detect significant epicardial coronary stenosis (>70%).

The study group included 64 patients with a mean age of 56.4 years. 71.8% of patients were hypertensive. When we analyzed data from echocardiography and coronary angiography we obtained the following results: global longitudinal strain (GLS) was more altered in hypertensive group compared with normotensive ones and statistically significant ( $p < 0,05$ ) for SLG12 ( $-16,6\% \pm 3,1$  vs  $-18,8\% \pm 2,6$ ) and SLG6 ( $-15,6\% \pm 3,1$  vs  $-18\% \pm 2,5$ ) but without statistically significance for SLG18 ( $-18,9\% \pm 3,6$  vs  $-20,5\% \pm 2,6$ ). Also, in hypertensive patients, GLS was more altered in patients with significant coronary lesions compared to those without stenosis for SLG18 ( $-17,3\% \pm 4,1$ , vs  $-19,3\% \pm 3,4$ ) and SLG12 ( $-15,9\% \pm 2,8$  vs  $-16,7\% \pm 3,1$ ), but without statistical significance. For SLG6, longitudinal strain alteration was similar regardless of the presence of coronary lesions ( $-15,61\% \pm 2,5$  vs  $-15,65\% \pm 3,2$ ). SLG18 was similar in hypertensive patients with normal coronary arteries and normotensive patients with significant coronary stenosis ( $-19,7\% \pm 2,7$  and  $-19,36\% \pm 3,4$  respectively).

Hypertensive patients has a more altered myocardial deformation regardless of the presence of coronary stenosis especially in middle and basal segments (SLG12 and SLG6). The presence of hypertension has the same impact on myocardial deformation as the presence of significant coronary lesions in normotensive patients (for SLG18), suggesting impaired microcirculation in this category of patients.

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## Preliminary short-term results of a population of patients treated with MitraClip therapy: one center experience

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This retrospective analysis sought to evaluate 1-month outcomes and therapy effectiveness of a population of patients treated with MitraClip therapy. We describe in this article the preliminary results of primary effectiveness endpoint.

Percutaneous Mitral Repair is being developed to treat severe mitral regurgitation (MR), with increasing real-world cases of functional MR (FMR). In the EVEREST (Endovascular Valve Edge-to-Edge Repair Study) II trial, percutaneous device showed superior safety but less reduction in MR at 1 year. 4-year outcomes from EVEREST II trial showed no difference in the prevalence of moderate-severe and severe MR or mortality at 4 years between surgical mitral repair and percutaneous approach.

We analysed retrospectively collected data from one center experience in Italy enrolled from January 2011 to December 2016. The study included 62 patients [mean age  $74 \pm 11$  years, 43 men (69%)] with MR of at least grade 3+. Most of patients had functional MR, were in New York Heart Association (NYHA) functional class III or IV, with a large portion (78%) of mild-to-moderate Tricuspid Regurgitation (TR). One or more clips were implanted in 67 procedures (62 patients).

Severity of MR was reduced in all successfully treated patients, 54 (90%) were discharged with  $MR \leq 2+$  (primary effectiveness endpoint). Clinical 1-month follow-up data showed an improvement in NYHA functional class (42 patients (70%) in NYHA class I-II). 60 of 62 (97%) successfully treated patients were free from death and mitral valve surgery at 1-month follow-up. MitraClip therapy reduces functional MR with acute MR reduction to  $< 2+$  in the great majority of patients, with a large freedom from death, surgery or recurrent MR in a great portion of patients.

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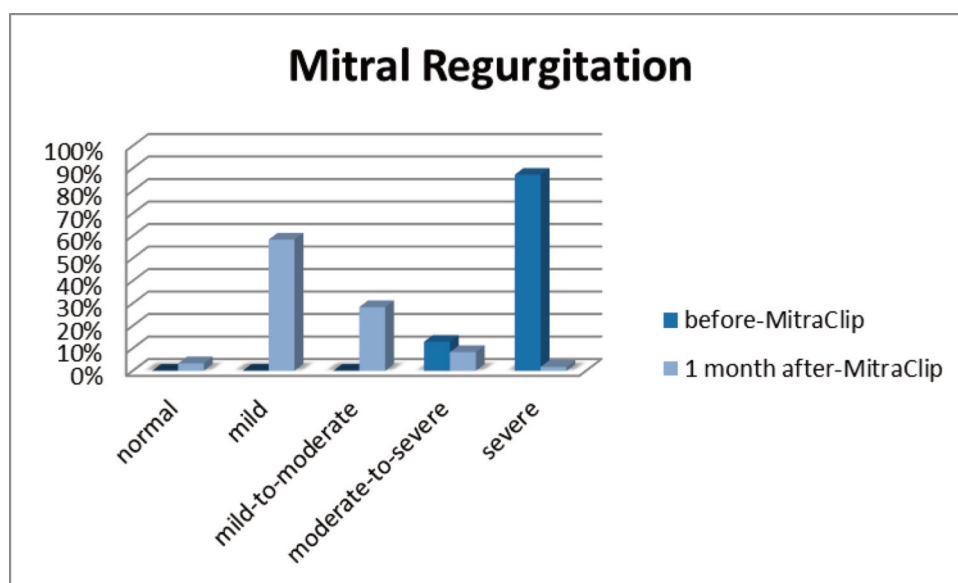


Figure 1 Mitral Regurgitation at baseline and at 1-month follow-up.



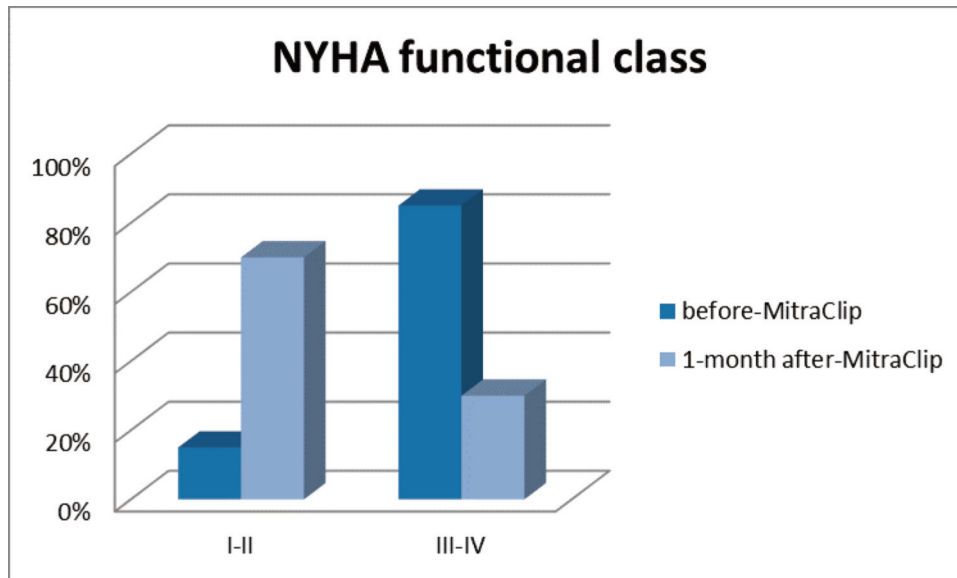


Figure 2 NYHA functional class at baseline and at 1-month follow-up.



## From macro to microcirculation in a young patient with coronary disease

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To emphasize how dysfunction of myocardial microcirculation may influence clinical presentation and symptoms in a patient with treated significant coronary artery disease.

Case presentation: A 43 years old male patient, smoker and dyslipidemic, presents at the emergency department with severe sudden-onset chest pain that had been lasting for the past 4 hours. ECG shows ST elevation in the infero-lateral territory and a STEMI diagnosis is made. The patient receives iv tenecteplase and is transported to the nearest medical facility where he undergoes percutaneous coronary angiography with placement of a BMS at the site of the culprit lesion – mid segment of the circumflex artery. A 60% stenosis is present in the proximal segment of the same artery but is not treated at the time. Afterwards, the patient received pharmacological therapy, there was no recurrence of chest pain, was clinically stable and was discharged. After three months he returned to the emergency department with recurring chest pain. He had been free of angina until the previous two weeks, when the chest pain reoccurred, usually with mild exercise. Initially it was relieved by sublingual nitroglycerine. During the past 24h hours it had become persistent and would not be relieved by nitroglycerine. The patient had stopped smoking and had been compliant to medical therapy. As there were no ECG changes and cardiac biomarkers were negative, the patient was admitted with a diagnosis of unstable angina. At this time coronary angiography described the same findings as before, there was no vasospasm during the procedure, and the FFR measurement performed at the site of the proximal circumflex artery stenosis after infusion of 250 mg adenosine was 0.99. Pharmacological therapy was optimized and after the initial iv nitroglycerine, he received, on top of his previous therapy (beta-blocker, ACE inhibitor, dual antiplatelet, high-dose statin and aldosterone antagonist) a slow-release nitrate and a calcium channel blocker. For the following months the patient was compliant to therapy, started regular physical activity and lost weight. His blood pressure levels and LDL-C levels were at target. However, he continued to have short episodes of chest pain with characteristics resembling those experienced during the acute coronary syndromes. On subsequent evaluations there were no pathological findings on serial ECGs and echocardiography and repeated stress tests were negative.

We interpreted the case as microvascular angina in a patient with multiple cardiovascular risk factors and two previous acute coronary syndromes. In this case, eccentric coronary plaque with positive remodeling and increased peripheral resistance in the myocardium may better explain the symptoms. In this case IVUS and OCT may yield a more conclusive evaluation of the coronary arteries and their hemodynamics, to better explain the patient's symptoms.

## Oxidative stress and lifestyle related factors in hospitalized patients with metabolic syndrome

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Metabolic syndrome components have a negative influence on nitric oxide production and its biological function, thus inducing oxidative stress and pro inflammatory status.

The aim of this cross-sectional study was to evaluate the relation between dietary and non-dietary lifestyle-related factors and endothelial dysfunction in a group of patients with MS hospitalized in a medical clinic from western Romania

The group was done by 40 patients hospitalized in our clinic of Internal Medicine for Metabolic Syndrome (MS), according to the ATP III criteria of MS and we evaluated the vascular damage using intimal media thickness (IMT) of the common carotid artery by B-mode ultrasonography in lying supine. All the patients were assessed by clinically and by biochemical tests and a nutrition risk factors questionnaire. The oxidative stress was evaluated indirectly by measuring Acid Thio-Barbituric -reactive substances (ATB) in peripheral venous blood as marker of oxidative stress.

High calories diet (nutrition questionnaire) was found in 39/40 patients, recreational alcohol consumption in 22/40p, smoking in 24/40p, decrease of physical activity in 38/40 p, intima-media thickness index (IMT) values of common carotid artery more than 0,9mm or plaque in 25/40p. ATB-reactive substances was significantly higher, which can be explained by an increased of oxidative stress or due to decreased enzymatic and non-enzymatic antioxidant defenses of the patients with MD

Dietary and non-dietary related factors can contribute to the appearance of endothelial lesions. Smoking is present in only 60% of the patients, while alcohol consumption, high calories diet and lack of physical activity are strongly correlated with asymptomatic vascular damage. The oxidative stress is also a factor associated with endothelial dysfunction retrieved in metabolic syndrome.