LEFT MAIN CORONARY DISEASE IS HIGHER IN OBESE PATIENTS NON-ST SEGMENT ELEVATED MYOCARDIAL INFARCTION/UNSTABLE ANGINA PECTORIS

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Objective: *Obesity is a major independent risk factor for coronary artery disease. In this study, we aimed to evaluate the angiographically characteristics of lesions in obese patients admitted with non-ST segment elevated myocardial infarction or unstable angina pectoris.*

Material and Method: *One hundred fifty three patients with acute coronary syndromes (NSTEMI/UAP) were performed coronary angiography. Patients were grouped as body mass index lower than 25 (Group 1, n=95) and over 25 (group 2, n=58). Presence of angiographic unstable lesion and coronary lesion distribution were assessed and compared between groups. Statistical analysis was performed by Chi-square test using SPSS 11.0 for Windows.*

Results: *Presence of angiographic unstable lesion was not different between groups [29(%30.5) vs 22(%37.9), p> 0.05], whereas main vessel disease was higher in obese group despite a statistically insignificance [1(%1,6) vs 5(%10,9), p >0.05]. Naturally, three vessel disease was increased in both groups admitted with NSTEMI/UAP [21(%45,7) vs 25(%40,3), p>0.05)].*

Conclusion: *Three vessel disease is higher in either obese or non-obese patients admitted with NSTEMI or UAP. But it should be remind when an obese patient with NSTEMI/UAP was planned to coronary angiography for a possible further early interventional therapy. Also, presence of angiographic unstable lesion may lead with such a incidence may lead the physician to aggressive antiplatelet therapy.*

Key Words: *Obesity, non-ST segment elevated, myocardial infarction*

INTRODUCTION

Obesity is a major independent risk factor for coronary risk factor ( ). Obesity is an inevitable metabolic disorder mainly induced by modern lifestyle including high calory and fat intake, physical inactivity, and psychological stress ( ). It is significantly associated with increased cardiovascular morbidity and mortality ( ). While the waist circumference below 102 cm in men and 88 cm in women with the BMI between 25.0 and 29.9 indicate "increased risk" for type 2 diabetes, hypertension, and cardiovascular disease, waist circumference above 102 cm in men and 88 cm in women with the BMI between 25.0 and 29.9 indicates "high risk" for those diseases ( ). That means overweight with BMI of 25 kg/m2 is a cut off for onset of cardiovascular risk for patients. Obesity is clearly associated with abnormal endothelial dysfunction with an increased peripheral vascular resistance due to decreased nitric oxide ( ). Patients with BMI over 25 kg/m2 has increased total risk stroke either ischemic or hemorrhagic ( ) In postmortem examinations of arteries of patient with age between 15 and 34 years and died from non-cardiac etiologies demonstrated that obesity was closely associated with advanced lesions (fibrous plaques and plaques with calcification or ulceration) referred vulnerable plaque leading acute coronary syndrome and especially located in right coronary artery and abdominal aorta ( ). Characteristics of the obese patients in the catheterization were younger age, single vessel disease and more clinical events over the post 30 day period after the cardiac catheterization. Also association of obesity with the rapid progression of atherosclerotic processes within the carotid artery was reported ( ).

In this study we aimed to evaluate the angiographic characteristics of obese patients admitted with acute coronary syndrome; non-ST segment elevated myocardial infarction or unstable angina pectoris. Because obesity may cause a worse lesion distribution or characteristics, which may have the potential to complicate or challenge the interventionist cardiologists during intervention, due to the insulin resistance, pro-inflammatory state and endothelial dysfunction.

MATERIAL AND METHOD

One hundred fifty three patients with acute coronary syndromes (NSTEMI/UAP), who were followed up and performed coronary angiography, were enrolled to the study. Initial diagnosis and management of UAP and NSTEMI was conducted according to the guidelines of ACC/AHA. All the patients were managed with acetylsalicylic acid, heparin, beta blocker, nitrate and statin and also ACE inhibitors when indicated. Initiative to the timing for coronary angiography (mean 48±16 hours), course and duration of medication was left to the primary physician at the coronary care unit. Standard coronary angiography via right femoral artery was performed (Philips Integris V5000, Philips Medical Systems, Netherlands, 2000). Angiographic findings was analyzed by software of Coronary Analysis (L.No.991107-004, Philips Medical Systems, Netherlands, 2000) independently of clinical interpretation and treatment decided at the end of the case enrollment by a cardiologist experienced in interventional cardiology and blinded to the patients' clinical recordings. Patients' characteristics and body mass indexes were recorded by another staff blinded to the angiographic findings and diagnosis. Presence of coronary artery disease accountable for the clinic presentation and also its severity was sought during the evaluation. A stenosis over 50% in any epicardial artery or any side branch ?2.5 mm was accepted as critical coronary disease. Patients not having coronary lesions met that criterion was accepted as noncritical coronary artery disease. Critical coronary disease was classified as main coronary artery disease, single vessel, two vessel, and three vessel disease according to the number of the coronaries diseased. Each coronary lesion was evaluated for regarding localization, length, irregularity, presence of thrombus, being osteal or not, presence of ruptured plaque. Presence of

unstable lesion and also lesion distributions of patients having critical coronary disease were compared between two groups composed as patients with BMI <25 kg/m2 and with BMI ?25 kg/m2. Statistical analysis was performed by Chi-square test using SPSS 11.0 for Windows.

RESULTS

Presence of angiographic unstable lesion was not different between groups [29(%30.5) vs 22(%37.9), p> 0.05], whereas main vessel disease was higher in obese group with statistically insignificance [1(%1,6) vs 5(%10,9), p >0.05]. Naturally, three vessel disease was higher both of the groups with critical coronary artery stenoses [21(%45,7) vs 25(%40,3), p>0.05)].

Table 1. Age and Body mass index of the study groups

	BMI <25 kg/m² (n=95)	BMI ≥25 kg/m² (n=58)
Age (years)	62.85±12,9	63.22±12,5
Body Mass Index BMI (kg/m²)	24.21±1,39	27.3±1.6

Table 2. Comparison of groups for presence of angiographic unstable lesion

BMI	Presence of angiographic unstable lesion		P*
	Present	Not	
Grup 1 (n=95) (BMI<25)	66(%69,5)	66(%69,5)	>0,05
Grup 2 (n=58) (BMI≥25)	36(%62,1)	36(%62,1)	

* Chi-Square test; BMI, body mass index

Table 3. Comparison of coronary lesion distribution between groups

BMI	Left Main Coronary	Single vessel	Two vessel	Three vessel	P*
Group 1 (n=62) (BMI<25)	1(%1,6)	21(%33,9)	15(%24,2)	25(%40,3)	>0,05
Group 2 (n=46) (BMI≥25)	5(%10,9)	9(%19,6)	11(%23,9)	21(%45,7)	>0,05

* One way ANOVA test; BMI, Body mass index

DISCUSSION

In this study we aimed to evaluate the angiographic characteristics of obese patients admitted with acute coronary syndrome, NSTEMI/UAP. We evaluated the presence of angiographically unstable lesions and also coronary lesion distribution. Since it was reported that the patients with BMI above 25 kg/m2 had increased risk for cardiovascular disease, hypertension, and diabetes, we included those patients into the obese group and organized the study groups as patients with BMI below and over 25 kg/m2. Kruk et al. reported that increased incidence of vulnerable coronary lesions in patients with stable angina pectoris may aid to identify the vulnerable patients at high risk for further cardiovascular events ( ). So we aimed to discriminate the coronary lesion characteristics differing obese patients from the non obese. Also we aimed to identify whether obese the patients were at higher risk compared to non obese patients through our study group, composed of those vulnerable patients manifested NSTEMI/UAP.

Obesity is commonly associated with insulin resistance and endothelial dysfunction that promote the atherosclerotic processes. Also increased cardiovascular risk for women after 10-20 years following the menopause was associated with increased centrally deposition of fat and abdominal panniculus ( ). In advanced ages those atherosclerotic lesion becomes more complex and vulnerable ( ). In postmortem studies, it was found that obesity was associated with advanced lesions (fibrous plaques and plaques with calcification or ulceration) referred vulnerable plaque which may lead acute coronary syndrome. Also it was reported that this types of lesions were located in right coronary artery and abdominal aorta in men (11). Importantly, three of those five obese patients having left main coronary disease had additionally right coronary

disease in our study group. This was a significant result parallel with the previous data.

Angiographically unstable coronary lesion is of importance in predicting the patients at candidate for further aggressive anti-platelet and antithrombin treatment and early coronary intervention. It also guide risk stratification among patients with acute coronary syndromes. Anyway subtotal or periodic occlusion of a coronary lesion by rupture or fissure of an atherosclerotic plaque complicated by thrombus is accounted for non-ST segment elevation myocardial infarction or unstable angina pectoris ( ). We found that presence of angiographic unstable lesion was slightly increased in patients with BMI above 25 kg/m2 compared to patients having BMI within normal ranges; however the difference was not statistically significant. It was demonstrated that obese young individuals died from non cardiac etiology had vulnerable plaques having potential to progress acute coronary syndromes in their coronary arteries and abdominal aorta (7). This data support the finding of increased angiographic unstable lesion in obese patients in our study. So it should be reminded that obese patients with NSTEMI/UAP may have unstable angiographic unstable lesion predicting the necessity for more aggressive anti-aggregant therapy and early interventional therapy.

Azegami et al. conducted a study about the characteristics of young Japanese patients with coronary heart disease ( ). They reported a strong association between obesity and the occurrence of coronary heart disease in young patients. Lack of regular physical exercise was found to be an independent risk factor for coronary heart disease in younger patients. They suggested effective screening of high risk individuals and development of educational programs for youth. Hegazi et al. investigated the relationship of adiposity to subclinical atherosclerosis in obese patients ( ). They reported that arterial stiffness was the early findings of atherosclerosis induced by obesity, whereas the increased intima media thickness and coronary calcium score were the later findings of atherosclerosis induced by insulin resistance and hyperglycemia. Yilmaz et al. reported that collateral vessel development was poorer in obese patients having BMI ?30 kg/m2 with ischemic heart disease ( )

Different reports were there about the outcomes of percutaneous coronary interventions performed to obese patients in the literature. Although Gruberg et al. reported paradoxically poor outcomes of percutanoeus coronary intervention and highest risk for in-hospital complications in normal or lower body weights compared to overweight and obese patients ( ), Rana et al. reported high risk for target lesion restenosis in obese patients and suggested that obesity associated mechanism could be insulin resistance and inflammation ( ). The main difference of our study from those studies was that our study group was composed of patients admitted with non-ST segment elevated a myocardial infarction or unstable angina pectoris; in which subtotal occlusion and due to an ongoing thrombotic process on a fissured coronary plaque laid as pathophysiological mechanism. Additionally, left main coronary disease did not significantly differ among the groups of normal, overweight, and obesity in the study of Gruberg et al, whereas we found that left main disease was higher in obese patients with NSTEMI/UAP despite the difference was not statistical significant. This finding is of great importance for the future early interventional therapy. Because the high probability of presence of any left main disease accompanying obese patient with NSTEMI/UAP should alert the physician for the peri- or post-procedural complications and also necessity to transfer to emergency coronary bypass graft operation. This may implicate high mortality or morbidity rates for the outcomes of obese patient with NSTEMI/UAP.

STUDY LIMITATIONS

The reason why our findings did not have statistical significance may be the limited numbers of patient in our study population. We did not

include the patients with ST segment elevated myocardial infarction, because acute coronary syndromes such as non-ST segment elevated myocardial infarction or unstable angina pectoris are pathophysiologically different from STEMI.

CONCLUSION

As reported in previous studies, obese patients are of increased risk for atherosclerotic vascular disease due to increased insulin resistance and inflammatory response. This also associates with high morbidity and mortality rates for the cardiovascular events that may develop in obese patients. As we demonstrated in our study, angiographic unstable lesion and left main coronary disease are of high probability to accompany with NSTEMI/UAP in an obese patient. Both of these two issues have the great potential to complicate the prognosis of the patient and also early interventional therapy. So it should be strictly remind in obese patients with NSTEMI/UAP.

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