CLINICAL STUDY

Monocyte to high-density lipoprotein ratio: a prognostic factor for mitral valve prolapse?

Ozcan Abacioglu O

Ministry of Health University Adana City Education and Research Hospital, Cardiology Adana, Turkey.
oozcanabacioglu@gmail.com

ABSTRACT

BACKGROUND: Mitral valve prolapse (MVP) is a common disorder, afflicting 2 % to 3 % of the general population. Despite the general belief of a benign disorder, there is an increasing awareness of an association between mitral valve prolapse and sudden cardiac death from arrhythmia and also atherosclerosis. Monocyte to high density lipoprotein ratio (MHR) is a new tool for predicting inflammation, which plays a major role in atherosclerosis.
OBJECTIVE: To evaluate the relationship between MHR and the presence of MVP.
METHODS: The study population consisted of 82 patients with MVP and the control group of 78 normal individuals. Transthoracic echocardiograpy was performed for all of the study population and peripheral venous blood samples were drawn for measuring MHR and other haemotological parameters.
RESULTS: The patients with MVP were more likely to have higher MHR values (15.82±6.01 in MVP patients and 13.30 ± 6.43 in controls; p=0.011). Monocyte counts and MHR of the MVP group were significantly higher than the control group and MHR values were directly proportional with the regurgitation area.
CONCLUSION: The MHR is strongly associated with MVP and regurgitation area and might be a prognostic factor for patients with MVP *(Tab. 3, Fig. 1, Ref. 15)*. Text in PDF *www.elis.sk*.
KEY WORDS: high density lipoprotein cholesterol, mitral valve prolapse, monocyte.

Introduction

Mitral valve prolapse also known as floppy mitral valve syndrome, systolic click-murmur syndrome is a valvular heart disease disorder and is characterized by typical fibromyxomatous changes in the mitral leaflet tissue with superior displacement of one or both leaflets into the left atrium. Various symptoms like chest pain, dyspnea, syncope, palpitations and clinical findings like low blood pressure and electrocardiographic repolarization abnormalities have been associated with MVP (10). It may be sporadic or familial. Despite being the most common cause of isolated mitral regurgitation requiring surgical repair, little is known about the genetic mechanisms underlying the pathogenesis and progression of prolapse. Physical examination and two-dimensional (2D) echocardiography are the diagnostic gold standards for MVP. Prognosis has varried in the published literature and the denominator of the studies evaluating prognosis is the role of mitral regurgitation progression (2).

MVP is generally benign but several articles report sudden cardiac death in MVP patients due to both atherosclerosis and arrhythymia. MHR is a noninvasive, easy examination and can be used as an indicator for inflammation. In the present study we evaluate the relationship between MHR and MVP.

Methods

Study population

The study population consisted of 82 out of 160 consecutive patients undergoing echocardiographic assessment of MVP. Patients with hypertension, diabetes mellitus, asthma, previous myocardial infarction, congestive heart failure and significant valve disease other than MVP were excluded.

Echocardiographic examination

MVP was defined as billowing of any portion of the mitral leaflets ≥ 2 mm above the annular plane in a long axis view. Mitral regurgitation area was measured when detected and global cardiac functions were examined.

Blood samples

Venous blood samples of the patients were obtained after a fasting period of 12 hours; HDL levels, monocyte counts determined. MHR was calculated by dividing the monocyte count to HDL level.

Statistical analysis

Statistical analysis was carried out using SPSS program, version 17.0 (SPSS Inc., Chicago, IL, USA). Categorical variables

Ministry of Health University Adana City Education and Research Hospital, Cardiology Adana, Turkey

Address for correspondence: O.O. Abacioglu, MD, Ministry of Health University Adana City Education and Research Hospital, Cardiology Adana, Turkey.
Phone: 05326486280

are presented as frequencies and continuous variables as mean ± SD. Continuous variables with a normal distribution were analyzed with Student t test while Mann–Whitney U test was used for normally distrubuted variables. Pearson's method was used for correlation analysis. A p < 0.05 was considered as statistically significant.

Results

The control group without MVP consisted of 39 males (50 %) and 39 females (50 %). MVP group consisted of 31 males (37.8 %) and 51 females (62.2 %). The mean age of control group was 41.65±11.80 years while it was 38.05±13.28 years in the MVP group (Tab. 1).

There was a significant difference between MVP and control group for monocyte counts, and the mean monocyte counts were 698.62±165.47 10³ µL and 566.90±161.05 10³ µL in those groups, respectively (p=0.000 and p<0.05). Although HDL cholesterol levels were a little lower in the MVP group, the difference did not reach statistical significance (p=0.971). MHR of the control group was 13.30±6.43 while it was 15.82±6.01 in the MVP group, and the difference between the groups was statistically significant (p=0.011) (Tab. 2).

When we divided the MVP group into two who have mitral valve regurgitation or not; 47 patient (57 %) have not mitral regurgitation and 35 patient (43 %) of MVP group have mild or moderate regurgitation. MHR mean values were higher than the whole study population in the patients with mitral valve regurgitation, 19.30±6.83 and 13.23±3.60, respectively and the difference between subgroups was statistically significant (p=0.000).
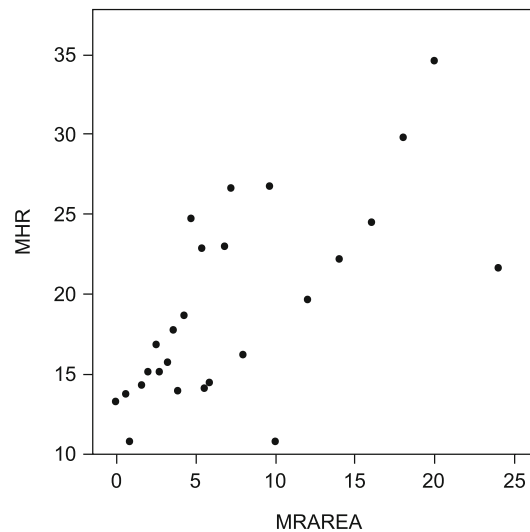

Fig. 1. Distribution of MHR levels due to mitral regurgitation area.

MHR values increased in direct proportion to mitral regurgitation area and the difference was statistically significant (r=0.643 and p<0.005) (Fig. 1).

Some of the patients in the study group were receiving medications containing different active substances because of their symtoms. The medications were as follows: 19 patients (23 %) metoprolol, 3 patients (3%) propronolol, 2 patients (2 %) nebivolol, 1 patient (1 %) bisoprolol and 1 patient (1 %) ca channel antagonists. There were no differences in terms of MHR between the patients having treatment or not and also between the subgroups of medically treated ones. P values are listed in the Table 3.

Discussion

The main findings of the present study were as follows: 1) A raised monocyte / HDL ratio was found to be significantly higher in patients with MVP. 2) The prognosis of MVP depends on regurgitation level and this was directly proportional to MHR values.

Mitral valve prolapse, a common disorder in developing countries, is generally accepted to be clinically benign, but it can result in a wide clinical spectrum, from atherosclerosis to malign arrhythmia. The association between MVP and sudden cardiac death has been reported but the underlying mechanisms remain poorly understood. Reported cases indicate that young females with bileaflet redundant leaflets are predominantly affected (11–12).

Hui-Chen Han at al. indicated that electrophysiological changes include frequent ventricular premature complex on holter monitoring and ventricular fibrillation as the predominant cardiac arrest rhythm in mitral valve prolapse in a review (6).

Tao-Cheng Wu et al demonstrated that coronary microvascular function could be impaired in patients with symptomatic MVP. Such impairment, when presented, was probably regional and located outside the territory of the left anterior descending

Tab. 1. The characteristics of mitral valve prolapse patients and controls.

	MVP group (n: 82)	Control group (n: 78)	p
Age	38.05 ± 13.28	41.65 ± 11.80	0.072
Gender			
Male	31	39	
Female	51	39	

Tab. 2. Laboratory test results of mitral valve prolapse patients and controls, and statistical analysis.

	MVP group	Control group	p
Monocyte (10³ µL)	698.62±165.47	566.90±161.05	0.000. p<0.05
HDL (mg/dL)	47.07±10.95	47.14±12.58	0.971
Monocyte/HDL	15.82±6.01	13.30±6.43	0.011. p<0.05

Tab. 3. MHR values according to treatments, and statistical analysis.

	MHR (mean±st.dev)	p
No treatment (NT)	15.99±6.66	
NT-metoprolol	15.37±4.57	0.707
NT-Propronolol	13.84±3.72	0.583
NT-Nebivolol	15.70±2.89	0.951
NT-Bisoprolol	14.02	0.770
NT-Ca channel antag.	22.84	0.313

coronary artery, and could be subclinical without ECG evidence of myocardial ischemia (13).

A new prognostic factor in cardiovascular disease, the ratio of monocytes to high-density lipoprotein (MHR), has recently been recommended and could be used as an indicator of inflammation. Elevated MHR levels were associated with cigarette smoking , obesity and muscular bridge diagnosed with coronary anjiography (4, 14, 15). The activation of monocytes and their differentiated forms into lipid-laden machropages plays a significant role in the promotion of immune defense and also drives inflammation and cardiovascular disease (1, 3, 9). Johnsen at al. demonstrated that an elevated monocyte count can be used as an independent predictor of future plaque development in previously plaque-free arteries (8). Both monocyte counts and MHR values in mitral valve prolapse patients were higher than control patients in our study population. These results clearly indicated that MVP patients tend to be at a higher risk for development of future cardiovascular disease than other patients.

Conclusıon

This study was first to investigate the significance of the MHR in patients with MVP. Our study demonstrated that patients with MVP have higher MHR values than do patients without the condition. The MHR may be used as a simple, low-cost biochemical marker in the detection of cardiovascular risk in MVP. Further prospective studies are needed to evaluate the association between the MHR and MVP.

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