

Original Article

Echocardiographic Evaluation of Patients with Behçet's Disease

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ABSTRACT

Background: Considering the nature of Behçet's disease (BD), which involves multisystem inflammation, we sought to compare the echocardiographic characteristics of BD >5 years' duration with those of healthy subjects.

Methods: We compared 73 patients with BD with 74 age- and sex-matched healthy controls. The subjects underwent transthoracic echocardiography and tissue Doppler imaging for the measurement of cardiac function and evaluation of the heart valves. The echocardiographic parameters were then compared between the study groups.

Results: Among the echocardiographic parameters, only left ventricular end-diastolic diameter was significantly lower in the patients with BD (47.0 ± 5.2) than that in the control group (50.8 ± 4.7 ; $P < 0.001$). There was also no relationship between the echocardiographic parameters and the active stage of the disease.

Conclusions: Diastolic dysfunction was significantly more common in the patients with BD >5 years' duration than in the control group. The other echocardiographic indices were similar in both groups. (*Iranian Heart Journal 2015; 16(4): 6-11*)

Keywords ■ Behçet's disease ■ Echocardiography ■ Left ventricular end-diastolic diameter ■ Systolic function ■ Diastolic function

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Behçet's disease (BD) is a multi-systemic, inflammatory, autoimmune disease with an unknown etiology.¹ Articular, vascular, intestinal, pulmonary, cutaneous, and neurological involvements are

common in this disease and its basic pathological process is vasculitis.² Mucocutaneous and neurological involvements are the most common manifestations of the disease;³ however, due

to the systemic inflammatory nature of the disease, the involvement of the other organs and systems is quite common.⁴

Although cardiac involvement is not a dominant complication in BD, it is observed in some patients. Cardiac involvement in BD is also known as cardiobehçet.⁵ This condition includes endocarditis, pericarditis, myocarditis, valvular disorders, intracardiac thrombosis, endomyocardial fibrosis, cardiomyopathy, coronary artery lesions, and arrhythmias—particularly ventricular arrhythmias.^{6,7} However, data on cardiovascular involvement are limited to case reports and case series. Many aspects of cardiovascular involvement have not been explored yet. Although transthoracic echocardiography has been used to investigate cardiac involvement in previous studies,^{4,8} there is limited evidence regarding the echocardiographic features of patients with BD in the various stages of the disease. Accordingly, we aimed to investigate the echocardiographic characteristics of patients with BD >5 years' duration referred to our institution in comparison with those of healthy controls. We also compared the echocardiographic characteristics of patients with active disease and those who were in remission to determine whether disease flare-up could influence the cardiac structure and function.

METHODS

In this study, we enrolled patients with BD >5 years' duration referred to the Rheumatology Clinic of Dr. Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran. Patients with a history of cardiovascular disease were excluded. Age- and sex-matched healthy controls were selected from the hospital staff. All the participants signed an informed consent before enrolment in the study, and the study protocol was approved by the institutional board of research and Ethics Committee of Tehran University of Medical Sciences.

Following admission, detailed history was obtained from the patients and clinical examination was performed by the physician in charge. Demographic variables comprised age, sex, height, weight, and waist circumference. The patients were also checked for the presence of the classic cardiovascular risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking, and family history of premature coronary artery disease. Clinical parameters encompassed heart rate, blood pressure, presenting symptom, history of myocardial infarction or stroke, and congestive cardiac failure. Accordingly, the patients were allocated to 2 groups of with or without the metabolic syndrome.

After collecting baseline demographic and clinical data at the time of admission, the patients were evaluated via transthoracic echocardiography and tissue Doppler imaging, using the GE Vivid 7 Dimensions ultrasound system (GE Healthcare, Milwaukee, WI). All the echocardiographic evaluations were performed by a cardiologist, who was blinded to the study protocol. Left ventricular (LV) size was assessed in terms of end-systolic and end-diastolic diameters in the parasternal long-axis view and end-systolic and end-diastolic volumes in the apical 4-chamber view. LV systolic function and ejection fraction (LVEF) were measured using the Simpson method, M-mode, and eyeball. LV size was evaluated by measuring LV diameter in the apical 4-chamber view. End-systolic and end-diastolic volumes were both measured in apical 4-chamber view. The reference limits of all the echocardiographic parameters were defined according to the guidelines of the American Society of Echocardiography.⁹

Statistical Analysis

The continuous variables are shown as means \pm standard deviations (SD) and the categorical variables are described as numbers (percentages). The paired *t*-test was utilized to

compare the continuous variables between the study groups. The chi-square test was used to compare the categorical variables between the groups. All P values <0.05 were considered statistically significant. The statistical analyses were performed using PASW software, version 18 (SPSS Inc., Chicago, Illinois, U.S.A.).

RESULTS

In this study, we compared 73 patients with BD >5 years' duration (mean age= 42.2 y;

male gender=48%) with 74 healthy individuals as the control group. The mean duration of disease in the patients with BD was 18.8 ± 6.7 years. Except for body mass index (BMI), both groups were more likely to be similar in the demographic and clinical variables. Prolonged QT interval was identified in 8 patients with BD, while none of the controls had it. However, this was not significantly different. The baseline characteristics of the study groups are compared in Table 1.

Table 1. Comparison of the baseline demographic and clinical characteristics between the patients with Behçet's disease and the healthy controls

| Characteristics | Control (n=74) | Behçet's Disease (n=73) | P Value |
|---------------------------------|----------------|-------------------------|---------|
| Age, y | 40.2±9.1 | 42.2±7.3 | 0.13 |
| BMI, kg/m ² | 24.6±2.7 | 26.3±4.3 | 0.01 |
| BSA, m ² | 1.9±0.4 | 1.7±0.3 | 0.52 |
| Systolic blood pressure, mm Hg | 119.2±21.5 | 110.1±22.7 | 0.55 |
| Diastolic blood pressure, mm Hg | 76.0±15.1 | 68.5±11.0 | 0.16 |
| Pulse rate, bpm | 87.2±7.1 | 81.5±9.3 | 0.19 |
| Respiratory rate, /min | 16.0±1.6 | 14.9±1.7 | 0.25 |
| Diabetes mellitus, n (%) | 5 (6.8) | 7 (9.5) | 0.54 |
| Hypertension, n (%) | 6 (8.2) | 7 (9.6) | 0.77 |
| Dyslipidemia, n (%) | 0 (0) | 2 (9.5) | 0.13 |
| Smoking, n (%) | 6 (8.5) | 11 (15.3) | 0.34 |
| Family history of CAD, n (%) | 0 (0) | 6 (8.5) | 0.05 |
| Noncardiac disease, n (%) | 11 (16.2) | 12 (17.1) | 0.87 |
| ST-T change in ECG, n (%) | 2 (40) | 5 (11.9) | 0.09 |
| Prolonged QT interval, n (%) | 0 (0) | 8 (20.0) | 0.32 |
| Heart block, n (%) | 0 (0) | 1 (2.4) | 0.75 |
| Dysrhythmia, n (%) | 0 (0) | 1 (2.4) | 0.75 |

Abbreviations: BMI, Body mass index; bpm, Beat per minute; BSA, Body surface area; CAD, Coronary artery disease; ECG, Electrocardiogram

In the comparison between the patients with BD and the control group apropos the echocardiographic parameters, there were no significant differences between the groups except regarding end-diastolic diameter, which was more likely to be lower in the patients with BD ($P<0.001$) (Table 2). Two

patients in the BD group had systolic dysfunction, while none of the controls had this condition ($P=0.22$). Nonetheless, diastolic dysfunction was significantly more common in the patients with BD (17 cases) than in the controls (5 cases) ($P<0.001$).

Table 2. Comparison of the echocardiographic characteristics between the patients with Behçet's disease and the healthy controls

| Characteristics | Control (n=74) | Behçet's Disease (n=73) | P Value |
|----------------------|----------------|-------------------------|---------|
| LVH, N (%) | 5 (6.8) | 6 (9.0) | 0.64 |
| MR, N (%) | 6 (21.4) | 9 (22.0) | 0.95 |
| MVP, N (%) | 6 (26.1) | 5 (11.9) | 0.14 |
| Calcification, n (%) | 1 (4.8) | 0 (0) | 0.16 |
| TS, N (%) | 0 (0) | 1 (2.0) | 0.49 |
| TR, N (%) | 4 (23.5) | 3 (10.0) | 0.21 |
| AS, N (%) | 0 (0) | 1 (2.0) | 0.49 |
| AR, N (%) | 2 (25.0) | 2 (9.6) | 0.36 |
| PS, N (%) | 0 (0) | 1 (2.6) | 0.48 |
| PI, N (%) | 4 (40.0) | 3 (18.8) | 0.23 |
| TRG | 19.6±3.3 | 18.3±2.4 | 0.2 |
| PAP | 24.1±3.5 | 21.2±5.2 | 0.1 |
| AR | 27.8±3.9 | 28.4±4.0 | 0.46 |
| LA | 34.2±4.5 | 34.6±8.1 | 0.72 |
| LVEDD | 33.5±5.2 | 32.6±5.5 | 0.31 |
| LVEDD | 50.8±4.7 | 47.0±5.2 | <0.001 |
| PWT | 7.8±1.1 | 7.8±1.6 | 0.68 |
| Septal thickness | 7.7±1.5 | 7.7±1.9 | 0.81 |
| LVEF | 57.8±3.8 | 57.7±3.9 | 0.81 |
| M mode | 54.2±7.2 | 57.5±5.1 | 0.07 |
| Simpson | 56.9±3.0 | 58.2±4.1 | 0.32 |
| Eye ball | 57.0±3.3 | 57.2±3.6 | 0.85 |

Abbreviations: AR, Aortic regurgitation; AS, Aortic stenosis; LA, Left atrium; LVEDD, Left ventricular end-diastolic diameter; PWT, Posterior wall thickness; LVEF, Left ventricular ejection fraction; LVH, Left ventricular hypertrophy; LVESD, Left ventricular end-systolic diameter; PAP, Pulmonary artery pressure; MR, Mitral regurgitation; MVP, Mitral valve prolapse; PI, Pulmonary insufficiency; PS, Pulmonary stenosis; TR, Tricuspid regurgitation; TS, Tricuspid stenosis

DISCUSSION

In the present study, we observed a tendency for diastolic dysfunction in our patients with BD in comparison with our healthy controls. However, there were no other significant echocardiographic findings in this group.

The earliest reports of cardiovascular involvement in the context of BD mostly included patients with ventricular thrombi, pericarditis, great artery vasculitis, and valvular involvement.^{8,10} As cardiac symptoms were uncommon in BD, providing thorough information on cardiovascular conditions in patients with BD was always an issue. So, the frequency and pathophysiology of cardiac lesions in BD are not clear yet and cardiovascular involvement has been reported as 7–46%.¹¹ In a pioneer study on the echocardiographic evaluation of patients with BD, cardiovascular findings included mild-to-moderate asymptomatic pericarditis, slight

aortic root dilatation suggesting aortic aneurism, and mitral regurgitation.⁸ In another study including 35 patients with BD, dilatation of the proximal aorta, interatrial septal aneurysms, and mitral valve prolapse were the common echocardiographic findings among the patients.⁷ Moreover, sporadic cases of endocarditis, myocarditis, pericarditis, aortic aneurysm, acute myocardial infarction, ventricular thrombosis, congestive cardiomyopathy, and valve dysfunction have been reported.^{5,12,13} The findings of our study were also similar to previous works. Although none of the valvular conditions were different from the control group, some of the conditions such as tricuspid stenosis, aortic stenosis, and pulmonary stenosis were only observed in the patients with BD. This may be attributable to the involvement of the great arteries inasmuch as the stenosis of the pulmonary arteries in the context of BD-related vasculitis has been

previously reported.¹⁴ Nonetheless, we did not evaluate the presence of vasculitis in patients who had valvular stenosis.

We also noticed that LVEDD was significantly lower in the patients with BD, which may be the sign of diastolic dysfunction. This is in line with another study that showed a higher rate of diastolic dysfunction in patients with BD and suggested myocardial fibrosis and coronary ischemia due to vasculitis as the probable causes of this diastolic dysfunction.⁷

Study Limitations

The first and foremost limitation of this study is the limited number of its participants. BD is not a very common disease; therefore, case selection for clinical studies on BD is challenging. On the other hand, this was a single-center study in a university hospital and the patients received standard care and treatment. Consequently, it is probable that the patients in this study were well-controlled and, thus, had an acceptable clinical condition with minimal complications as compared to patients with BD who live in smaller cities and who may not receive ideal care and, as such, may have more complications including cardiovascular involvement. We, thus, recommend a multicenter study incorporating a larger number of patients with BD in different stages of the disease. Long follow-up of the patients and regular echocardiographic evaluations may help to understand the exact changes of cardiac function and structure in patients with BD.

CONCLUSIONS

Transthoracic and Doppler echocardiography is a useful method for assessing cardiovascular involvement in BD. Our study showed lower LVEDD as a sign of diastolic dysfunction in the patients with BD, although the other echocardiographic parameters were statistically similar to those in the healthy controls. The findings of the present study

highlight the necessity for assessing cardiac function in patients with BD. Further investigations are required on the various aspects of cardiac involvement in BD. Indeed, there is a great need for further studies to determine the exact changes in the cardiac function and its exacerbation through time in order to establish preventive and treatment measures.

Conflict of Interest

The authors have no conflict of interests to declare.

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