Cardiac involvement in rheumatoid arthritis: A cross-sectional study in Iran

Irandoht Shenavar Masoleh a, Habib Zayeni a,*, Asghar Haji-Abbasi a, Manouchehr Azarpira b, Ali Hadian a, Amir Hassankhani c, Banafsheh Ghavidel Parsa a

aRheumatology Research Center, Razi Hospital, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran
bCardiovascular Research Center, Heshmat Hospital, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran
cMedical Student, Student Research Center, Guilan University of Medical Sciences, Rasht, Iran

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A B S T R A C T

Background: Cardiovascular disease is one of the extra-articular manifestations of rheumatoid arthritis (RA) that is the most common cause of death in these patients. So we decided to evaluate RA patients in terms of history, clinical examination, electrocardiography, and echocardiography to determine the prevalence of types of cardiac involvements in these patients.

Methods: 100 consecutive patients, diagnosed with RA, referred to rheumatology clinic in Razi referral hospital of Rasht, Iran, were enrolled.

Complete physical examination of the joints was performed in all subjects to evaluate the remission of disease. Signs and symptoms of possible cardiac involvement were evaluated in patients by taking history and erythrocyte sedimentation rate test; moreover, an expert cardiologist performed complete cardiovascular examination in all participants. Then, all subjects were referred to a same center for electrocardiography and echocardiography.

Finally, analysis was performed by using chi-square and t tests.

Results: 23 (23%) males and 77 (77%) females were included in this study. Tachycardia, dyspnea, and chest pain were the most cardiac signs and symptoms of patients. 32 subjects had abnormal findings in electrocardiogram. The most abnormal findings in patient’s ECG were ST interval and T wave changes. Abnormal findings in echocardiography were observed in 74 participants. Pericardial involvement and ventricular dysfunction were the most abnormal findings in patient’s echocardiography. We found a significant relation between duration of RA disease and abnormal echocardiography findings (p < 0.05).

Conclusion: This study indicates the high prevalence of cardiac involvement in RA patients.

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* Corresponding author.
E-mail address: guilan.rheumatology@gmail.com (H. Zayeni).
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1. Introduction

Rheumatoid arthritis (RA) is a chronic systemic disease with unknown etiology. It is characterized with persistent inflammatory synovitis that usually affects peripheral joints with symmetric distribution. The course of this disease varies from mild and short-term oligoarticular disease to severe and progressive polyarthritis disease with significant dysfunction.1,2

The prevalence of RA disease is about 1% in general population and affects women three times more than men, approximately.2

The onset of RA disease, almost in two-thirds of patients, is associated with fatigue, anorexia, general weakness, and vague musculoskeletal symptoms; this initial phase may take weeks to months. Along with symmetric involvement of joints, especially hand and foot joints, specific symptoms appear gradually.3,4

Extra-articular manifestations of RA can occur during the course of this disease and even before onset of arthritis.5

Cardiovascular disease is one of the extra-articular manifestations of RA that is the most common cause of death in these patients.6,7

All layers of the heart may involve in RA patients. Pericarditis is the most common form of cardiac involvement in these patients; moreover, valvular disorders, coronary vasculitis, and ventricular diastolic dysfunction can be seen in RA.6,7

Therefore, we decided to evaluate RA patients in terms of history, clinical examination, electrocardiography, and echocardiography to determine the prevalence of types of cardiac involvements in RA patients.

2. Methods

We conducted a cross-sectional study in a referral rheumatology clinic in Razi hospital of Rasht, Iran.

In this study, 100 consecutive patients, diagnosed with RA, according to the ACR-EULAR Classification Criteria for Rheumatoid Arthritis 2010,6 were enrolled.

Pregnant persons and patients with history of smoking, renal failure, diabetes, hypertension, upper respiratory tract infection, thyroid dysfunction, and other systemic diseases were excluded from study.

Demographic and clinical data such as sex, age, job, drug history, and duration of disease were gathered.

Complete physical examination of the joints was performed by an expert rheumatologist in all subjects to evaluate the remission of disease.

Signs and symptoms of possible cardiac involvement were evaluated in patients by taking history and erythrocyte sedimentation rate (ESR) test; moreover, an expert cardiologist performed complete cardiovascular examination in all participants. Then all subjects were referred to a same center for electrocardiography and echocardiography.

The Ethical Committee of Guilan University of Medical Sciences approved this study and informed consent for participation in the study was obtained from all subjects.

2.1. Statistical analysis

Analysis was performed by using chi-square and t tests. All statistical analyses were done by SPSS software 17.0. p values less than 0.05 were considered significant.

3. Results

Patients included in this study, 23 (23%) males and 77 (77%) females, were 19–81 years old and the mean age was 49.74 ± 11.56 years.

History findings, clinical, and laboratory characteristics of patients were listed and summarized separately in Table 1.

Of the 100 RA patients, 25 subjects had complete remission. Tachycardia, dyspnea, and chest pain were the most cardiac signs and symptoms of patients (38, 36, and 34 subjects, respectively).

Thirty-two subjects had abnormal findings in electrocardiogram (ECG). The most abnormal findings in patient’s ECG were ST interval and T wave changes (15 subjects, in total). Moreover, sinus tachycardia was observed in 1, low voltage in

| Table 1 – History findings, clinical, and laboratory characteristics of patients. |
|---------------------|-----|
| Signs and symptoms of cardiac disease | n = 100 |
| Dyspnea | 36 |
| Chest pain | 34 |
| Tachycardia | 38 |
| Orthopnea | 3 |
| Syncope | 7 |
| Cardiac murmurs | 7 |
| S3 | 0 |
| S4 | 6 |
| Arrhythmia | 6 |
| Positive hepatojugular reflex | 5 |
| Increased jugular vein pressure (JVP) | 4 |
| Edema | 7 |
| Pulmonary rales | 6 |
| Drug history | |
| Calcium | 52 |
| Folic acid | 46 |
| Methotrexate | 71 |
| Prednisolone | 83 |
| Chloroquine | 68 |
| Vitamin D | 2 |
| Diclofenac | 4 |
| Norzaptopine | 1 |
| Carbamazepine | 2 |
| Sandimon | 1 |
| Fluoxetine | 2 |
| Famotidine | 2 |
| Fersulf | 1 |
| Alendronate | 7 |
| Inderal | 12 |
| Imuran | 1 |
| Cobix | 1 |
| Chemonazepam | 1 |
| Amitriptyline | 3 |
| Omeprazole | 1 |
| Ranitidine | 1 |
1, premature ventricular tachycardia in 2, axis deviation in 3, poor R progression in 3, branch block in 4, and pulmonary P in 5 patients.

Abnormal findings in echocardiography were observed in 74 participants. Pericardial involvement and ventricular dysfunction were the most abnormal findings in patient’s echocardiography (47 and 45 subjects, respectively). Our findings from patients’ echocardiography were as follows: decreased ejection fraction in 1, aortic insufficiency in 1, aortic stenosis in 3, pericardial effusion in 5, mitral regurgitation in 9, mitral valve prolapse in 11, pericarditis in 42, and diastolic dysfunction in 44 patients.

Among these 74 patients, 17 (22.9%) subjects were male and 57 (77.0%) subjects were female; there was no significant relation between gender and abnormal echocardiography findings in RA patients (p > 0.05). Moreover, from these patients, only 19 (25.6%) persons had complete remission in terms of RA disease that showed no significant relation between RA remission and abnormal echocardiography findings (p > 0.05).

Fifty percent of patients (9 subjects from 18) who were younger than 40 years of age had abnormal findings in echocardiography, while these findings were observed in 79.2% of patients (65 subjects from 82) who were older than 40 years of age. These results showed a significant relation between aging and abnormal echocardiography findings in RA patients (p < 0.05).

The mean duration of RA disease in subjects was 5.6 years; in total of 74 patients with abnormal findings in echocardiography, only 10 (13.5%) patients were in the first year of RA disease, 36 (48.6%) subjects were in one to five years period of RA disease, and 29 (39.1%) persons suffered from RA more than five years. We found a significant relation between duration of RA disease and abnormal echocardiography findings (p < 0.05).

Moreover, in this study, of the 41 patients without cardiac symptoms, 31 subjects (75.6%) had abnormal findings in echocardiography, while among the 59 symptomatic patients, abnormal echocardiography findings were observed in 43 subjects (72.9%).

4. Discussion

Investigations have shown that RA disease decreases the lifetime of patients (4 years in men and 10 years in women) and cardiac involvement is the most common reason of it.\(^5\)

In this study, we used echocardiography as an imaging technique for evaluation of RA patients. Echocardiography is one of the best imaging techniques for evaluation of macroscopic cardiac damages in the world. On the other hand, the major superiority of echocardiography in comparison with other advanced imaging techniques such as magnetic resonance imaging and computed tomographic angiography is that echocardiography is mobile and real time and can be used at the bedside, in the cardiac catheterization laboratory, in the intensive care unit (ICU), in the emergency room, and anywhere else. These advantages allow for the performance of imaging instantly before, during, and after different procedures.\(^5\)

In the present study, out of the 47 patients with pericardial involvement, 42 subjects had fluid accumulation with pericardial thickening in echocardiography and in all of these cases, the severity of pericarditis was mild. From the 45 patients with ventricular dysfunction in this study, diastolic dysfunction in 44 persons and reduced ejection fraction in 1 subject were observed. Moreover, valvular disorders were found in 15 patients and mitral valve dysfunction (including mitral valve prolapse and mitral valve insufficiency) was the most common form of these disorders.

In two past similar studies by Selçuk\(^10\) and Di Franco\(^11\) that were done separately on RA patients, without considering the duration of disease, a large percent of patients had ventricular dysfunction in echocardiography; similarly, in our study, about half of the patients had ventricular dysfunction in echocardiography.

In Selçuk study, that is similar to our study in terms of type of study and sample volume, of the 100 patients, 67 subjects had disorders in echocardiography including pericardial involvement in 15%, diastolic dysfunction in 57%, mitral valve involvement in 24%, and aortic valve involvement in 7% of subjects.\(^10\)

It seems that the higher percent of cardiac involvement in ours and in Selçuk study, compared with reported percent in reference books, is due to consideration of diastolic dysfunction.

In our study, abnormal echocardiography findings were observed in 75.6% of subjects without cardiac symptoms, and in 72.9% of symptomatic patients; this issue indicates that cardiac involvement in RA patients in the majority of cases is asymptomatic and mentioned cardiac symptoms are not specific for RA.

In a recent study, we found a significant relation between duration of disease and abnormal echocardiography findings; on the other hand, we observed no significant relation between RA remission criteria and abnormal echocardiography findings; these two results in our study are similar to the obtained results from Franco study.\(^7\)

The past studies have shown that RA can result in coronary atherosclerosis as the same as diabetes and hypertension so that 30–50% of RA patients mortality is due to cardiovascular disorders.\(^12\) The high prevalence of diastolic dysfunction, ST interval and T wave changes in our study can confirm the ischemic changes in RA patients.

5. Conclusion

This study indicates the high prevalence of cardiac involvement in RA patients.

So early detection of cardiac involvement (using ECG, echocardiography, etc.) may reduce the morbidity and mortality due to cardiovascular causes in these patients.

We suggest a prospective study with a larger sample size and longer follow-up period for evaluation of cardiac involvement in patients with RA.

Conflicts of interest

The authors have none to declare.
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