

Prevalence of Coronary Artery Disease in Patients Undergoing Valvular Operation Due to Rheumatic Involvement

Romatizmal Kapak Hastalığı Nedeniyle Kapak Ameliyatı Yapılan Hastalarda Koroner Arter Hastalığı Prevalansı

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ABSTRACT

Objective: Rheumatic heart disease is still a major health problem in developing countries. The impact of coronary artery disease (CAD) on or its relation to rheumatic fever is not well established. We aimed to evaluate the prevalence of CAD and atherosclerotic risk factors in patients who underwent valvular surgery due to rheumatic heart disease.

Methods: The records of 346 patients who had undergone rheumatic valvular surgery in a university hospital between 1996 and 2002 were evaluated.

Results: Coronary angiography was performed in 218 (63%) patients, of whom 41 (18.8%) had CAD. The mean age of the patients having CAD and normal coronary arteries were 57.3 and 50.5 years respectively ($p<0.001$). In the study population patients with CAD had significantly increased prevalence of diabetes mellitus (14.6% vs. 4.5%; $p=0.02$), hypertension (36.6% vs. 16.4%; $p=0.003$), smoking (51.2% vs. 23.2%; $p=0.001$) and family history of CAD (39.5% vs. 20.0%; $p=0.01$) compared to patients with normal coronary arteries. However, the prevalence of dyslipidemia was similar in both groups (45.9% vs. 36.4%; $p=0.1$).

Conclusion: These findings suggest that coronary artery disease prevalence in rheumatic valvular disease patients is similar to the normal population of same age. In cases where invasive assessment of valvular lesions is not indicated we suggest coronary angiography to be performed only in patients having clinical suspicion of CAD or multiple risk factors. (*Anadolu Kardiyol Derg 2004; 4: 223-6*)

Keywords: Rheumatic valvular heart disease, coronary artery disease, coronary risk factors.

ÖZET

Amaç: Romatizmal kapak hastalığı (RKH) gelişmekte olan ülkelerde hala önemli bir sağlık sorunudur. Koroner arter hastalığı (KAH) ile RKH arasındaki ilişki net olarak bilinmemektedir. Biz bu çalışmada romatizmal tutulum nedeniyle kapak ameliyatı yapılmış olan hastalarda KAH ve aterosklerotik risk faktörlerinin prevalansını saptamayı amaçladık.

Yöntem: Üniversitesi hastanesinde 1996 ve 2002 yılları arasında RKH nedeniyle ameliyat edilen 346 hastanın kayıtları geriye dönük olarak incelendi.

Bulgular: Koroner anjiyografi 218 (%63) hastaya uygulanmış ve 41 (%18.8) hastada KAH saptanmıştı. Ortalama yaş KAH saptanan hastalarda 57.3 yıl ve koroner damarları normal olanlarda ise 50.5 yılı idi ($p<0.001$). KAH saptanan hastalarda diyabetes mellitus (%14.6 ve %4.5; $p=0.02$), hipertansiyon (%36.6 ve %16.4; $p=0.003$), tütün kullanımı (%51.2 ve %23.2; $p=0.001$) ve ailede erken aterosklerotik kalp hastalığı (%39.5 ve %20.0; $p=0.01$) prevalansı koronerleri normal olanlara göre anlamlı düzeyde yüksekti. Dislipidemi sıklığı ise gruplar arasında benzer bulundu (%45.9 ve %36.4; $p=0.1$).

Sonuç: Bu bulgular RKH bulunan hastalarda KAH prevalansının aynı yaş normal popülasyon ile benzer olduğunu göstermektedir. Valvüler lezyonun girişimsel olarak değerlendirilmesinin gerekmediği hastalarda koroner anjiyografi işleminin KAH klinik şüphesi bulunan veya aterosklerotik risk faktörleri olan hastalara yapılmasının gerekli olduğu düşünülmüştür. (*Anadolu Kardiyol Derg 2004; 4: 223-6*)

Anahtar kelimeler: Romatizmal kapak hastalığı, koroner arter hastalığı, koroner risk faktörleri

Introduction

Rheumatic valvular heart disease develops due to the host response to untreated pharyngitis caused by group A streptococci. Acute rheumatic fever is a systemic disease and heart is

one of the most commonly affected organs. It is still a major health problem in developing countries with an incidence of over 1 per 1000 (1) and an important cause of mortality and morbidity. In children and young adults it is the most common form of valvular disease requiring surgery (2-4). Although the inci-

dence of rheumatic valvular disease is much lower in Western population than it was in the past it is still the most common cause of mitral stenosis in these countries (5).

The incidence of associated coronary artery disease (CAD) in acquired valvular diseases has been studied in many trials (6-9). But the data regarding the prevalence of coronary atherosclerosis in rheumatic valvular disease is limited.

It is speculated that intramyocardial coronary arteries may be involved in the form of an arteritis in rheumatic fever (10). On the other hand, clinical and autopsy findings suggest the rheumatic heart disease to be quite rare in patients who died of myocardial infarction (11). For this reason it is accepted that myocardial infarction most commonly occurs in association with atherosclerotic heart disease. So the impact of CAD on or its relation to rheumatic valvular disease is not well established. In this study, we aimed to evaluate the prevalence of coexistent CAD and coronary risk factors in patients who underwent valvular surgery due to rheumatic involvement. The prevalence of atrial fibrillation, history of cerebrovascular accident and left ventricular dysfunction was also evaluated.

Material and Methods

The records of 346 patients undergoing valvular surgery due to rheumatic involvement in a university hospital between January 1996 and December 2002 were examined. Valvular lesions were defined as rheumatic on the basis of echocardiographic and surgical findings (diffuse fibrous thickening leading to leaflet rigidity, commissural fusion, thickened and shortened chordae tendineae, calcific deposits on leaflets) supported by the evidence of past group A streptococcal throat infection and/or history of acute rheumatic fever. Nonrheumatic valvular lesions (degenerative and/or ischaemic) were excluded from the study. Routine biochemical and blood count results, patients' functional class according to the New York Heart Association, presence of angina were noted. Twelve lead electrocardiogram (ECG) was used for rhythm analysis and echocardiographic examination results were also recorded. Age (male \geq 45 years, female \geq 55 years), hypertension (antihypertensive drug use or blood pressure \geq 140/90mmHg on 2 or more occasions), diabetes mellitus (history of diabetes mellitus or fasting blood glucose \geq 126mg/dl), dyslipidemia (total cholesterol $>$ 200 mg/dl, LDL cholesterol $>$ 130mg/dl or HDL cholesterol $<$ 40mg/dl), smoking (current cigarette smoking or quit \leq 2 years) and family history of premature ischaemic heart disease (\leq 55 years of age male first degree relatives, \leq 65 years of age female first degree relatives) were recorded as the major coronary risk factors. Coronary angiography was performed to all patients over 40 years of age. Those below 40 years also underwent coronary angiography if they had clinical suspicion of CAD, angina and/or coronary risk factors. Angiographically significant CAD was defined as at least 50% diameter narrowing of one or more of the coronary arteries.

Results

The mean age of the study population was 45.6 ± 12.5 years. Two hundred twenty three (64.5%) patients were female and 123 (35.5%) patients were male. Coronary angiography was performed in 218 (63%) patients. Among them 177 (81.2%) had nor-

mal coronary arteries while 41 (18.8%) had CAD. The mean age of the patients with CAD was 57.3 years and those with normal coronaries was 50.5 years ($p < 0.001$). Twenty-four (6.9%) patients underwent coronary artery bypass grafting in addition to valvular surgery.

Among the major coronary risk factors; hypertension was present in 65 (25.4%), diabetes mellitus in 17 (4.9%), dyslipidemia in 87 (25.1%), smoking in 88 (25.4%) and family history of CAD in 70 (21.3%) patients in our study population (Table 1). As the results of coronary angiography were concerned, patients with CAD had significantly increased prevalence of diabetes mellitus (14.6% vs. 4.5%; $p = 0.02$), hypertension (36.6% vs. 16.4%; $p = 0.003$), smoking (51.2% vs. 23.2%; $p = 0.001$) and family history of CAD (39.5% vs. 20.0%; $p = 0.01$) compared to patients with normal coronary arteries. However, the prevalence of dyslipidemia was similar in both groups (45.9% vs. 36.4%; $p = 0.1$).

In the study population 108 (31.2%) patients had angina pectoris. Among the 41 angiographically proven CAD patients 29 (78.4%) had angina, while 12 (21.6%) were free of anginal symptoms. Of 238 patients without angina pectoris 53.2 % underwent coronary angiography, and 5.0 % had documented CAD, giving a rate of 9.5 % in those without angina who underwent coronary angiography. Thirty-two of 41 (78%) CAD patients were male and 9 (22%) were female ($p < 0.001$). In the study group, 93 of 123 (75.6 %) male and 125 of 223 (56.0 %) female patients underwent coro-

Table 1. Patient characteristics and laboratory findings

<i>History</i>	
Gender	223 F, 123 M
Age, (years)	45.6 ± 12.5
Angina, n (%)	112 (32.8)
Cerebrovascular accident, n (%)	36 (10.4)
<i>Atherosclerotic risk factors</i>	
Hypertension, n (%)	65 (18.8)
Diabetes mellitus, n (%)	17 (4.9)
Smoking, n (%)	88 (25.4)
Dyslipidemia, n (%)	87 (25.1)
Family history of CAD, n (%)	70 (21.3)
<i>Rhythm on ECG</i>	
Sinus rhythm, n (%)	154 (45.5)
Atrial fibrillation, n (%)	192 (55.5)
<i>Laboratory variables</i>	
Hemoglobin, g/dl	13.1 ± 1.6
Leucocytes, K/mm ³	7.9 ± 2.7
Platelets, K/mm ³	237 ± 154
Antistreptolysin-O, IU/ml	41.1 ± 13.8
Rheumatic factor, IU/ml	3.5 ± 11.8
BUN, mg/dl	19.8 ± 8.1
Serum creatinine, mg/dl	1.0 ± 0.8
Total cholesterol, mg/dl	179 ± 4.2
HDL cholesterol, mg/dl	43.2 ± 13.6
LDL cholesterol, mg/dl	111.8 ± 32.1
Triglycerides, mg/dl	129.7 ± 54.7
AST, U/L	29.1 ± 23.6
ALT, U/L	26.0 ± 37.0

ALT- alanine aminotransferase AST- aspartate aminotransferase, BUN- blood urea nitrogen, CAD- coronary artery disease, ECG- electrocardiography, HDL- high density lipoprotein cholesterol, LDL-low density lipoprotein cholesterol

nary angiography and the prevalence of CAD in male and female patients undergoing coronary angiography were 34.4 % and 7.2 % respectively.

There was no patient with angiographically documented CAD below the age of 40 years. The youngest patient with CAD was a 40 years old male and he had history of angina pectoris. There were only 7 CAD cases younger than 50 years.

When we considered the valvular involvement mitral valve disease was the most common lesion observed in 332 (95.9%) patients (246 mitral stenosis and 86 mitral regurgitation as the predominant lesion). One hundred and ninety five (56.3%) patients had tricuspid (14 tricuspid stenosis, 181 tricuspid regurgitation) and 95 (27.4%) patients had aortic (42 aortic stenosis, 49 aortic regurgitation) valve disease. Types of surgery performed were as follows: 118 (34.1%) patients underwent isolated mitral valve surgery (110 mitral valve replacement, 8 open mitral commissurotomy), 137 (39.6%) mitral valve replacement plus tricuspid plasty, 57 (16.5%) mitral valve replacement plus aortic valve replacement plus tricuspid plasty, 20 (5.8%) mitral valve replacement plus aortic valve replacement, 13 (3.7%) aortic valve replacement and 1 (0.2%) aortic valve replacement plus tricuspid valve replacement. Two hundred and fifteen (62.1%) patients had multiple valvular involvement. In 2 patients pulmonary stenosis was noted, but no surgical intervention was attempted.

Atrial fibrillation was present in 192 (55.5%) patients. However, preoperative use of oral anticoagulation was noted only in 45 (23.4%) patients with atrial fibrillation. Meanwhile the history of cerebrovascular accident was documented in 36 (10.4%) patients.

As the New York Heart Association functional classification was concerned, 280 patients (80.9%) were in class III, 62 (17.9%) in class II and 4 (1.2%) in class IV (Table 2). Left ventricular dysfunction was noted in 51 (14.7%) patients on echocardiography and in 43 patients (12.4%) on ventriculography.

Discussion

In previous studies the incidence of angiographically proven CAD in acquired valvular diseases has been shown to vary widely, from 9-41% (12-13). In aortic stenosis the incidence of CAD was reported to be as high as 37% in patients aged between 40-59 and 64% in those aged between 60-82 years (14). However the data regarding the coexistence of CAD in patients with rheumatic valvular disease is limited.

Table 2. Clinical data and valvular lesions

<i>NYHA functional class, n (%)</i>	
Class II	62 (17.9)
Class III	280 (80.9)
Class IV	4 (1.2)
<i>Valvular involvement, n (%)</i>	
Mitral stenosis	246 (71.0)
Mitral regurgitation	86 (24.8)
Tricuspid stenosis	14 (4.0)
Tricuspid regurgitation	181 (52.3)
Aortic stenosis	42 (12.1)
Aortic regurgitation	49 (14.1)
Pulmonary stenosis	2 (0.6)
NYHA: New York Heart Association	

Marchant E et al (15) analyzed the coronary angiographic results of 100 patients with rheumatic valvular disease and reported the prevalence of significant CAD (greater than 50% obstruction) to be as 14% in the study population. In that study coronary angiography was performed to all patients over the age of 50 years, those having angina or ECG signs of ischaemia. In a postmortem analysis Coleman and Soloff (16) found that coincident CAD was present in 13% of rheumatic heart disease patients.

In a study including 82 mitral stenosis patients undergoing coronary angiography CAD was documented in 21 (26%) patients. The authors indicated male sex, age and the presence of angina to be correlated with the presence of CAD (17). Esplugas E et al (18) reported the prevalence of significant CAD to be 11% in 300 rheumatic valvular disease patients. A similar study (19) revealed the prevalence of coronary atherosclerosis as 8.3% in rheumatic valvular disease patients. In this study only 3 patients were below 50 years of age.

A prospective study (20); evaluating angina, coronary risk factors and CAD in 387 patients with valvular heart disease, revealed that angina was present in 36.6% of the study population. One hundred twelve (28.9%) patients had CAD of whom 65 (58%) had angina pectoris, while 47 (42%) were free of it. Another finding was that, the presence of CAD increased in parallel with the number of coronary risk factors. In the absence of both angina and coronary risk factors the prevalence of CAD was found to be less than 3 %. They suggested that routine coronary angiography might be omitted in patients free of angina or coronary risk factors. Our findings are similar to those reported in this study.

Mattina CJ et al. (21) revealed the coexistent CAD in 28 % of mitral stenosis patients over the age of 40 years. They pointed out that coronary artery sclerosis is common in this population and it can be clinically silent. In our study the prevalence of CAD was 8.9% in patients with mitral stenosis and this finding might be related to the younger age and female predominance in our study population.

Another important finding was that atrial fibrillation is quite common in these patients (22). Noting the high rate of preoperative cerebrovascular accidents, as reported in our study, all the patients with atrial fibrillation should be advised to use oral anticoagulation before, as well as, after the valvular operation.

Some authors suggest that coronary angiography should be performed in all patients with valvular disease as a part of routine preoperative assessment (12, 23). They point out that it has low morbidity and mortality and can be performed by many centers easily. However, some authors suggest that it should be performed preoperatively only in patients over 40-45 years of age and having coronary risk factors (16, 20, 21, 24).

We found that coronary artery disease prevalence in patients with rheumatic valvular disease is not different from that of the similar age normal population (25). Coronary risk factors; hypertension, diabetes mellitus, smoking and family history of atherosclerotic heart disease, except dyslipidemia (which might be due to the young age of the study population) increase the likelihood of CAD. Male gender and older age are the other independent risk factors.

In conclusion; considering the therapeutic and prognostic importance of diagnosing CAD preoperatively in rheumatic valvular disease patients we believe that coronary angiography

should be performed in all patients having clinical suspicion of CAD, over the age of 40 years and in patients with angina and/or coronary risk factors. It can be omitted in patients below the age of 40 with neither angina nor coronary risk factors.

Study Limitations

Although this study included relatively large number of rheumatic heart disease patients undergoing valvular operation it has several limitations. Firstly, our study had a retrospective design. Secondly, coronary angiography was performed in only 63% of the study population. This might have led to underdiagnosis of especially clinically silent CAD in patients who did not have coronary angiography.

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