

THE FREQUENCY OF MITRAL VALVE PROLAPSE IN ELECTROCARDIOGRAPHIC DISTURBANCES OF UNKNOWN ORIGIN*

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Mitral valve prolapse is a clinical entity characterized by posterior protrusion of the leaflet tissue during ventricular systole. With the wide application of echocardiography, the syndrome is easily detectable and has been found to be frequent. Available data indicate that mitral valve prolapse is common in the general population^{1,2}. Since all age groups of patients with mitral valve prolapse are susceptible to bacterial endocarditis, it is important to detect the condition as early as possible.

In the majority of cardiac cases, ECG abnormalities are secondary to congenital heart disease, rheumatic heart disease, myocarditis, administration of digitalis, etc. For some patients, however, the origin of ECG changes is not known. Some ECG disturbances are seen in addition to other symptoms and findings in patients with mitral valve prolapse syndrome, but to our knowledge the frequency of mitral valve prolapse among patients with ECG abnormalities of unknown origin has not been determined. The present study seeks to answer that question.

Material and Methods

The study was carried out in the Pediatric Cardiology Unit at the Hacettepe University Institute of Child Health on 40 patients showing ECG abnormalities of undetermined cause and 26 healthy controls with normal ECGs. Nineteen of the patients were male and 21 were female, and their ages ranged from 4 to 17 years (average 9.6). Twelve of the controls were male and 14 were female, with ages ranging from 4 to 18 years (average 8.4).

Both groups were studied echocardiographically. An Ekoline 20A diagnostic ultrasound and Ekoline 21 recorder were used. The transducer was 2.25 MHz and 13 mm in diameter.

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Results

Table I presents data on the patients studied. Among the 40 cases with ECG abnormalities, 24 were found to have mitral valve prolapse. Only 2 (7.6%) of 26 control cases had mitral valve prolapse.

TABLE I
THE FREQUENCY OF MITRAL VALVE PROLAPSE IN
ECG CHANGES OF UNKNOWN ORIGIN

Type of ECG changes	Total cases	Cases with mitral valve prolapse
Premature beats	16	7
Paroxysmal atrial tachycardia	8	5
Wandering pacemaker	2	1
WPW syndrome	1	1
Prolonged P-R	3	3
Complete heart block	1	—
RV conduction delay	3	3
Prolonged Q-T	2	1
ST-T changes	4	3
	40	24 (60%)

Discussion

Mitral valve prolapse, also termed systolic click-late systolic murmur syndrome³, has been a major subject of interest and investigation among cardiologists in recent years. The great majority of the patients are asymptomatic, but nervousness, emotional instability, tachycardia, shortness of breath, and palpitation may be observed. It is probable that the clinical entities known in the past as neurocirculatory asthenia, soldier's heart and DaCosta's syndrome represent cases of mitral valve prolapse⁴.

Echocardiography as a non-invasive method plays an important role in the diagnosis of the mitral valve prolapse syndrome. In echocardiography in the normal situation, the mitral leaflets come together in systole and gradually rise throughout the systo-

lic phase of the cardiac cycle⁵, although there may be an occasional slight downward motion early in systole. In many patients with a prolapsed mitral valve, on the other hand, there is a downward or posterior displacement of the mitral leaflets starting at midsystole and continuing throughout the latter half of systole (Figure 1). The leaflets may return to their normal position just before the onset of diastole. In the second characteristic echo pattern of mitral valve prolapse, hammock-like pansystolic posterior bowing is seen.

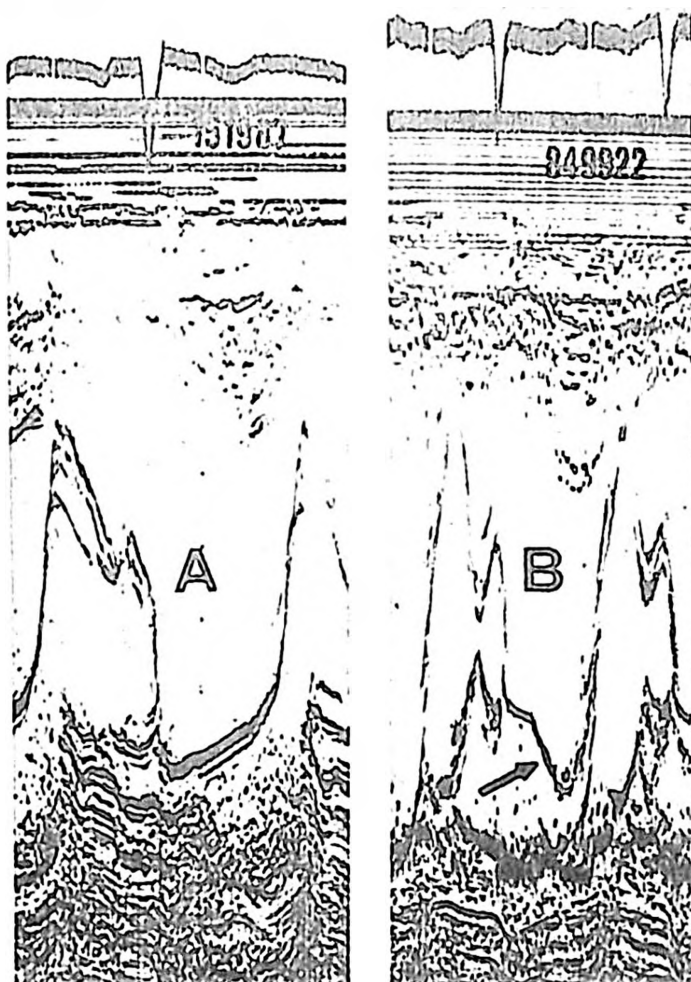


Figure 1.

Echocardiograms.

A — Normal mitral valve.

B — Prolapsed mitral valve.

Arrow indicates prolapse.

Echocardiography can frequently confirm the clinical impression. However, Popp et al⁶ estimate the incidence of negative echocardiograms to be 10 percent, pointing out that this will occur when the pathologic process is localized to single scallops of the mitral valves. When echocardiography is used as a scanning method, on the other hand, mitral valve prolapse can be detected even in cases of "silent prolapse"⁷, when there are no auscultatory findings.

The electrocardiographic disturbances reported to occur in association with prolapsed mitral valve fall into three general categories: disorders of repolarization, disorders of conduction, and arrhythmias. Although the exact frequency of ECG

changes in cases with mitral valve prolapse is unknown, Barlow and Pocock³ found 37% of their 144 adult patients to have ECG abnormalities, while Gingell and Vlad⁸ found ECG changes in 51% of their 73 childhood cases. Among our 40 patients with ECG disturbances of unknown origin, 24 had mitral valve prolapse (60%).

Disorders of repolarization seen in mitral valve prolapse are ST-T changes and Q-T prolongation. The frequency of ST-T disturbances was found to be 42% in Jeresaty's cases with mitral valve prolapse⁹ and 35% of the cases in Sloman et al's series¹⁰. Five of our cases showed disorders of repolarization with an unknown etiology, of which four had mitral valve prolapse echocardiographically. Although the exact mechanism of these changes is unknown, several authors have attributed them to abnormal tension on the papillary muscle creating local ischemia¹¹.

The patients may suffer from incapacitating chest pain. The pain is left-precordial, stabbing, may last for several hours or days and usually does not have the characteristics of classic angina pectoris. However, chest pains of the anginal type have also been reported¹².

A wide variety of arrhythmias has been encountered in mitral valve prolapse, including supraventricular tachycardia, atrial fibrillation, atrial flutter, ventricular ectopic beats, ventricular tachycardia, and ventricular fibrillation³. Premature ventricular contractions are the most common rhythm disturbance and may be unifocal or multifocal. Winkle et al¹³ recorded ectopic beats in 75% of their patients with mitral valve prolapse who were followed up continuously for 24 hours. Jeresaty⁹, Winkle et al¹⁴, and Gooch et al¹⁵ found supraventricular or ventricular premature beats in 25%, 50%, and 50% respectively, of their cases with mitral valve prolapse. Sixteen of our cases had premature beats, of whom 7 showed mitral valve prolapse. These findings indicate that in cases with premature beats of unknown origin, mitral valve prolapse should be investigated.

In mitral valve prolapse, palpitation may be a manifestation of arrhythmias (atrial or ventricular) but has also been documented to occur without any electrocardiographic changes. Of our 7 cases with premature contractions and mitral valve prolapse, 4 complained of palpitation. Syncopes and near-syncopes occur with ventricular fibrillation¹², although they have been reported even without it¹⁴. They are often precipitated or aggravated by emotion and exercise. Barlow and Pocock³ stated that ventricular arrhythmias could be caused by abnormal tension on papillary muscles with secondary papillary muscle and adjacent myocardial ischemia. They also stated that atrial arrhythmias would be difficult to explain on that basis.

Of our 8 patients with paroxysmal atrial tachycardia of unknown etiology, we detected mitral valve prolapse in 5. The frequency of paroxysmal atrial tachycardia among cases with mitral valve prolapse was found to be 10% by DeMaria et al¹⁶ and

30% by Winkle et al¹⁴. We suggest careful echo study in all cases with paroxysmal atrial tachycardia of unknown origin to detect mitral valve prolapse.

Conduction disturbances have also been observed and include sinoatrial block, complete heart block, left or right bundle branch block, right ventricular conduction delay, and prolongation of the P-R interval³. Barlow and Pocock³ reported 7 cases with conduction disturbances among their series of 144 adults with prolapsed mitral valve. Gingell and Vlad⁸ reported 90% conduction abnormalities in 73 children with mitral valve prolapse. All 3 of our cases with prolonged P-R interval of unknown origin had mitral valve prolapse. Mitral valve prolapse was not observed in a case with complete A-V block. Three cases with right ventricular conduction delay had mitral valve prolapse. The mechanism of these conduction disturbances also requires clarification. It is possible that there is interruption of the conduction system as a result of fibrosis in the myocardium, as was observed at necropsy in one patient¹⁷. Alternatively, the small coronary vessels supplying the sinus and atrio-ventricular nodes, the His bundle or its branches, may be involved by a degenerative process similar to that seen in the Marfan syndrome.

In conclusion, we can state that a relatively high percentage of mitral valve prolapse is found in cases showing ECG disturbances of unknown origin. In order to apply prophylactic measures for bacterial endocarditis, the possibility of mitral valve prolapse should be investigated in all patients with such ECG changes.

Summary

With the wide application of echocardiography, mitral valve prolapse syndrome has been detected easily and frequently. Available data indicate that mitral valve prolapse is common in the general population. Since all age groups of patients with mitral valve prolapse are susceptible to bacterial endocarditis, it is important to identify the presence of this condition as early as possible. To our knowledge, the frequency of mitral valve prolapse in patients with ECG abnormalities of unknown origin has not been determined. This study is aimed at answering this question. Sixty-six cases, including 40 patients with ECG disturbances of unknown etiology and 26 controls, were studied echocardiographically. Of the 40 patients, 24 had mitral valve prolapse (60%). In order to apply prophylactic measures for bacterial endocarditis, mitral valve prolapse should be sought in all cases having ECG changes of unknown origin.

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