THE SEVERITY OF MITRAL VALVE PROLAPSE IN CHILDREN CORRELATES WITH DIFFERENT TYPE OF SYMPTOMATOLOGY

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Abstract

Introduction: Mitral valve prolapse (MVP), the most common anomaly of the mitral valve apparatus, occurs when one or both mitral valve leaflets excessively billows into the left atrium toward the end of systole. Mitral regurgitation (MR) develops in some patients particularly those with more significant prolapse, when the valve edges fail to close properly. Most patients are asymptomatic and MVP is an incidental auscultatory finding especialy in children. Idiopathic MVP may be congenital in some patients, but recognition may be delayed until adolescence or adulthood. Familial cases are known and occur in an autosomal dominant pattern with variable penetrance and expression (familial mitral valve prolapse).

Material and method: A number of 49 patients were included in the study if they meet the following criteria: age between 6-12 years, documented MVP by transthoracic echocardiography and symptomatic patients. The exclusion criteria were: other associated valvular disease, evident structural heart disease, left ventricular hypertrophy, coronary heart disease and severe comorbidities. We divided our patients in two groups regarding the severity of MVP: group 1 – patients with mild or moderate MVP (without MR) and group 2 – patients with severe MVP (with MR). For each group we determine symptoms and percentage of occurrence and we compare between groups. We followed the study protocol for symptoms and each of our patients were asked to fill up a form regarding the symptoms they experienced and they have to mention them in order of appearance and their frequency. We were interested in certain symptoms like: chest pain, palpitations, arrhythmias, panic attacks, dizziness, syncope and skeletal abnormalities (thin children, height-to-weight ratio greater than normal, pectus escavatum, pectus carinatum). We use a VIVID 5 echo machine in order to determine a positive diagnostic of MVP in our patients. This is an essential tool to identify the presence and magnitude of MVP, the thickness of mitral valve leaflets, mitral annulus size, chordae tendineae length, and left ventricular and left atrial size and function; it also reveals any associated heart diseases which can meet the exclusion criteria. We perform a 12 lead ECG and/or 24 hour Holter in each of our patients to catch any rhythm disturbance (ectopic beats, sinus tachycardia), to explain palpitations.

Results: We included in the study, a total of 49 patients (pts.). We divided them in two groups: group 1 – mild or moderate MVP – 25 pts. and group 2 – severe MVP – 24 pts. The groups were homogeneous and they didn't have any significant differences regarding age, gender, weight and height values. The following symptoms had statistical significance for group 1: palpitations (p=0.008), arrhythmias (p=0.02) and panic attack (p=0.02). Dizziness and skeletal abnormalities had no statistical significance. The following symptoms had statistical significance for group 2: chest pain (p=0.003) and syncope (p=0.022).

We summarized all the symptoms for each group in a chart to understand better the prevalence of them. The association of palpitations and arrhythmias (demonstrated on 12 leads ECG) has a statistical significance (p=0.008) for group 1 and the association of palpitations and panic attacks a statistical significance (p=0.007) also for group 1. The association between chest pain and syncope has a statistical significance of (p=0.027) for group 2.

Conclusions: MVP presents itself in a various type of symptoms. We determined that, in children, some symptoms are more frequent in presentation than the other. Palpitations, panic attacks and arrhythmias caught on ECG are more probably to appear in moderate or mild MVP while chest pain and syncope in severe MVP.

Key words: mitral valve prolapse, children, chest pain, arrhythmias

Introduction

Mitral valve prolapse (MVP), the most common anomaly of the mitral valve apparatus, occurs when one or both mitral valve leaflets excessively billows into the left atrium toward the end of systole. Mitral regurgitation (MR) develops in some patients particularly those with more significant prolapse, when the valve edges fail to close properly. Most patients are asymptomatic [1] and MVP is an incidental auscultatory finding especialy in children. Idiopathic MVP may be congenital [2,3] in some patients, but recognition may be delayed until adolescence or adulthood. Familial cases are known and occur in an autosomal dominant pattern with variable penetrance and expression (familial mitral valve prolapse).

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Aim

The aim of the study is to correlate the different type of symptoms and their percentage of occurrence with the severity of MVP.

Method

The patients were included in the study if they meet the following criteria:

- age between 6-12 years
- documented MVP by transthoracic echocardiography
- symptomatic patients

The exclusion criteria were: other associated valvular disease, evident structural heart disease, left ventricular hypertrophy, coronary heart disease and severe comorbidities.

We divided our patients in two groups regarding the severity of MVP:

- group 1 – patients with mild or moderate MVP – without MR
- group 2 – patients with severe MVP – it means the presence of MR

For each group we determine symptoms and percentage of occurrence and we compare between groups.

Study protocol – echocardiographic measurements

We use a VIVID 5 echo machine in order to determine a positive diagnostic of MVP in our patients. This is an essential tool to identify the presence and magnitude of MVP, the thickness of mitral valve leaflets, mitral annulus size, chordae tendineae length, and left ventricular and left atrial size and function; it also reveals any associated heart diseases which can meet the exclusion criteria.

Two-dimensional, real-time echocardiographic pictures from parasternal long-axis window reveal the mitral valve leaflets coming together in systole and billowing into the left atrium beyond the atrioventricular junction.

The echocardiographic description of the MVP include structural changes, such as leaflet thickening, redundancy, annular dilatation, and chordal elongation. A varying degree of noncoaptation of the leaflets is present, and MR can be identified by Doppler-color, pulse wave, and continuous wave. The MR jet can be defined, and its magnitude and direction estimated. The size of the left atrium and left ventricle are increased in the presence of moderate-to-severe MR.

Study protocol – electrocardiography

We perform a 12 lead ECG and/or 24 hour Holter in each of our patients to catch any rhythm disturbance (ectopic beats, sinus tachycardia), to explain palpitations.

Study protocol – symptoms

Each of our patients were asked to fill up a form regarding the symptoms they experienced and they have to mention them in order of appearance and their frequency.

We follow certain symptoms like:

- chest pain
- palpitations
- arrhythmias
- panic attacks
- dizziness
- syncope
- skeletal abnormalities (thin children, height-to-weight ratio greater than normal, pectus escavatum, pectus carinatum)

Statistical analysis

The data was compared using "t-test" for the continual variables, Fisher's exact test, contingency table and multivariable regression. All the results were expressed in average values ± standard deviation (SD) and the correlation between the measurements was made using the multivariable regression analysis. The statistical analysis was made using the Stat View 6.0 (SAS Institute USA) software.

Results

We included in the study, a total of 49 patients (pts.). We divided them in two groups:

- group 1 – mild or moderate MVP – 25 pts.
- group 2 – severe MVP – 24 pts.

The groups were homogeneous and they didn't have any significant differences regarding age, gender, weight and height values (Table 1).

We recorded the following number of symptoms in each group (Table 2) and their statistical significance.

Table 1 – group parameters

Symptoms	Group 1		Group 2		p
	Mean	SD	Mean	SD	
Age	8.68	1.749	8.20	1.744	**0.174**
Gender	6 Male 19 Female		5 Male 19 Female		**1.000**
Height	125.61	14.022	124.79	10.653	**0.412**
Weight	35.42	9.012	37.21	8.943	**0.653**

Mean = average value; SD = standard deviation; p = statistical value

Table 2 – number of symptoms per group and statistical significance

Symptoms	Group 1	Group 2	p	Statistical significance / for group number	
Palpitations	15	5	0.008	Highly	**1**
Chest pain	10	20	0.003	Highly	**2**
Syncope	8	16	0.022	Very	**2**
Dizziness	10	11	0.776	Not	**----**
Arrhythmias	15	6	0.021	Very	**1**
Skeletal abnormalities	15	16	0.768	Not	**---**
Panic attack	19	10	0.020	Very	**1**

The following symptoms had statistical significance for group 1: palpitations (Fig.1), arrhythmias (Fig.2) and panic attack (Fig.3).

Dizziness and skeletal abnormalities had no statistical significance.

The following symptoms had statistical significance for group 2: chest pain (Fig.4) and syncope (Fig.5).

We summarized all the symptoms for each group in a chart (Fig.6).

The association of palpitations and arrhythmias (demonstrated on 12 leads ECG) has a statistical significance (p=0.008) for group 1 and the association of palpitations and panic attacks a statistical significance (p=0.007) also for group 1.

The association between chest pain and syncope has a statistical significance of (p=0.027) for group 2.

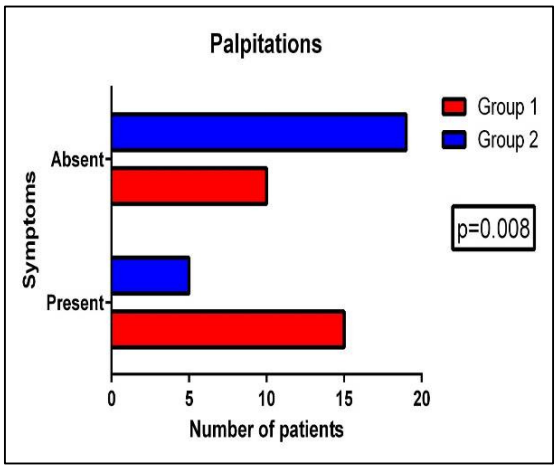

Fig.1 – Symptoms for group 1 – Palpitations.

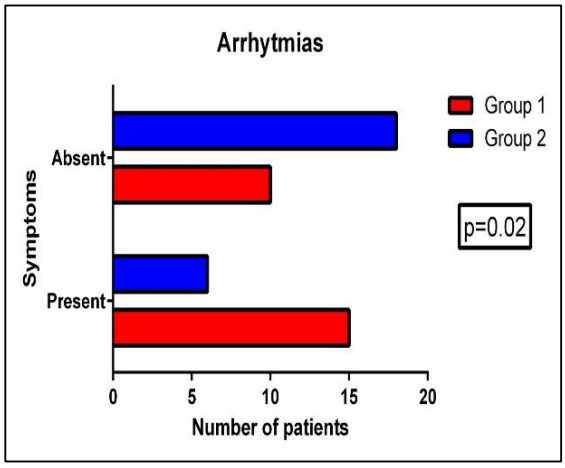

Fig.2 – Symptoms for group 1 – Arrhythmias.

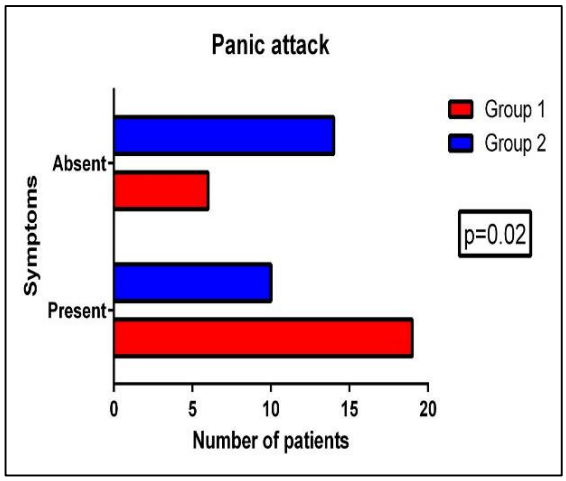

Fig.3 – Symptoms for group 1 – Panic attack.

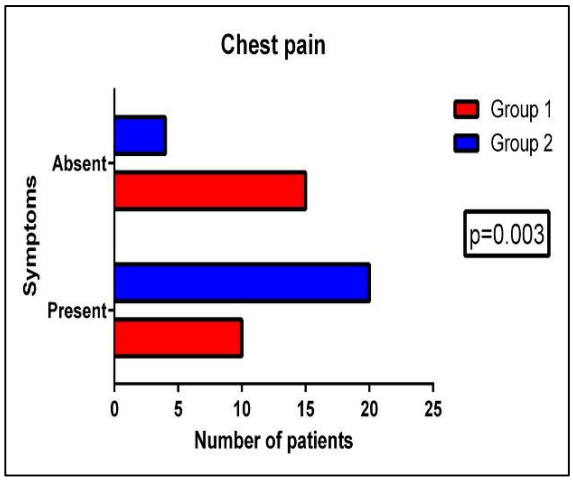

Fig.4 – Symptoms for group 2 – Chest pain.

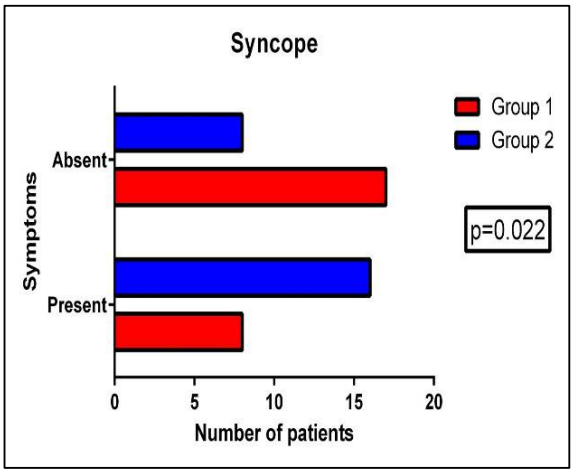

Fig.5 – Symptoms for group 2 – Syncope.

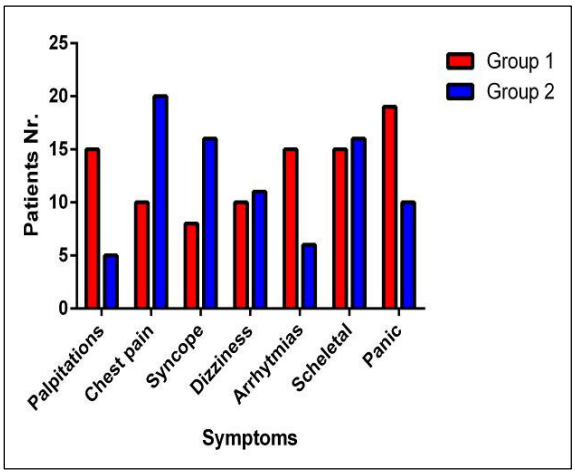

Fig.6 – Distribution of studied symptoms in the two groups.

Discussions

Regarding the symptoms we determined that palpitations (p=0.008), arrhythmias (p=0.02) and panic attacks (p=0.021) appear most often in group 1 (mild or moderate MVP) and they have statistical significance. Symptoms like dizziness and skeletal changes have no statistical significance for either group.

Chest pain (p=0.003) and syncope (p=0.022) are statistical significance for group 2 (severe MVP).

We go one step further and studied if association of two symptoms has statistical significance for one group or another. We showed that association of palpitations and arrhythmias (demonstrated on 12 leads ECG) has a statistical significance (p=0.008) for group 1 and the association of palpitations and panic attacks a statistical significance (p=0.007) also for group 1.

The association between chest pain and syncope has a statistical significance of (p=0.027) for group 2.

Chest pain may be caused by any of the following factors [4]: excessive stretching of the chordae tendineae, leading to traction on papillary muscles, coronary microembolism from platelet aggregates and fibrin deposits in the angle between the left atrium and the posterior mitral leaflet, inappropriate tachycardia and excessive postural changes and physical and emotional stresses, hyperadrenergic state, which increases myocardial oxygen demand and coronary artery spasm.

Palpitations [5] appearence may be related to cardiac arrhythmia [5], although this has not been conclusively proven.

Skeletal abnormalities are observed in two thirds of patients and do not fit into any of the recognized connective tissue disorders, although an occasional patient may have Marfan syndrome [6] or other related syndromes. Common findings are as follows: hypomastia, thin children, height-to-weight ratio greater than normal [7], arm span greater than height (dolichostenomelia), arachnodactyly, scoliosis [8], narrow anteroposterior chest diameter (straight back), pectus excavatum or pectus carinatum [9] and joint hypermobility. Panic atacks appears in many cases oo MVP [10,11].

Limitation

The small number of patients was the main limitation of this study. Also children under the age of six were not included because they were unable to fill up the symptoms form, for themselves.

Conclusions

MVP presents itself in a various type of symptoms. We determined that, in children, some symptoms are more frequent in presentation than the other. Palpitations, panic attacks and arrhythmias caught on ECG are more probably to appear in moderate or mild MVP while chest pain and syncope in severe MVP.

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