Clinical Study of Mitral Valve Prolapse in Karbala Governorate, Iraq

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Abstract

Background: Mitral valve prolapse (MVP) is the most common valvular cardiac disease in developed countries, with potential cardiac complications.

Objective: This study aims is to determine the prevalence and clinical presentations of MVP patients in Karbala Governorate, Iraq.

Material and methods: Medical records and trans-thoracic echocardiography (TTE) data of 1456 patients visiting the cardiology department of Imam Al-Hujjah Hospital, Karbala, Iraq, between May 2018 to August 2019 were used. All patients suffering from MVP were recruited in this study. The demographic, clinical, and TTE data were analyzed retrospectively.

Results: The prevalence of MVP is 4.4% with a female predominance. The mean age of MVP patients is 39.4 ± 20.5 years. The nonclassical MVP is more common (66%) than the classical type (34%). The majority of MVP patients had mild prolapse (n = 58, 90%). The most common mitral regurgitation (MR) severity associated with MVP was mild (40%), and the common presenting symptoms of MVP were chest pain (51%) and shortness of breath (50%). MVP types were strongly related with age (the classical one occurs more at a younger age) and severity of MR. The degree of MR associated with MVP was significantly related to age, MVP type, severity of MVP, and palpitations.

Conclusion: The prevalence of MVP in Karbala Governorate is similar to that reported in other international studies, with a female predominance. MVP is more predominant in young adults. The most common presenting symptoms are chest pain and SOB. However, MVP may have a more benign course than previously expected.

Abbreviations: Mitral valve (MV), mitral valve prolapse (MVP), mitral regurgitation (MR) , trans-thoracic echocardiography (TTE), shortness of breath (SOB), patient`s medical records (PMR), left atrium (LA).

Keywords: mitral valve; mitral valve prolapse; mitral regurgitation; prevalence; trans-thoracic echocardiography

Introduction

Mitral valve prolapse (MVP) is a condition of the superior displacement of one or both of the abnormally thickened leaflets of the mitral valve (MV), at least 2 mm upward into the left atrium (LA) during systole[1]. It can further be categorized into classical (leaflet thickness of at least 5 mm) or nonclassical.[2] The clinical entity "MVP" is a only known for about 60 years, before that this disease was misdiagnosed as pericardial adhesions or part of the rheumatic fever spectrum.[3] However, the name, diagnostic criteria, and management have evolved with time.[4] The prevalence of MVP is variable, with an average of 2–3% in the general population.[5] MVP is the primary cause for mitral regurgitation (MR) surgery and is the most common cardiac valvular abnormality in developed countries.[6–8]

Historically, MVP was linked to serious cardiac complications like significant MR, bacterial endocarditis, congestive heart failure, arrhythmia, syncope, and even sudden death.[9–11] However, recent studies suggest a more benign nature of MVP and less adverse clinical sequelae than reported before, probably due to the inclusion of several study samples, with more healthy people, improvement in diagnostic criteria, and imaging methods.[12]

MVP can be familial or acquired. Familial MVP is mainly autosomal dominant.[5] While the acquired MVP can be caused by the following disorders: myxomatous changes, fibroelastic deficiency, acute rheumatic fever, Marfan`s syndrome, bacterial endocarditis, papillary muscle rupture, or acute ischemia.[3]

The prevalence and diagnosis of MVP is a subject of debate. Still there are only a few studies this topic in Iraq. Hence, we decided to do a clinical observational study on MVP patients visiting outpatient cardiology clinic of the Imam Al-Hujjah Hospital, Karbala, Iraq. The main objective of this study was

1. To add more insight on the current knowledge of MVP diagnostic guidelines and their clinical implications.
2. To compare this study results with other similar previous studies.

Materials and Methods

This study was a retrospective analysis of the medical records and trans-thoracic echocardiography (TTE) data of 1456 patients (850 females and 606 males) who visited the Imam Al-Hujjah Hospital, Karbala, Iraq between May 2018 to August 2019 .

Clinical and demographical data including, age, gender, presentation of MVP (chest pain, shortness of breath (SOB), fainting, syncope, or arrhythmia) of the patients were obtained from the patient's medical records. The study included all TTE-confirmed MVP patients.

TTE data

Standard two-dimensional echocardiography and Doppler echocardiography were performed on the patients (Siemens Acuson-51000, Munich, Germany).

TTE diagnostic criteria for the included MVP patients were: superior displacement of mitral valve leaflets 2 mm or more toward the LA cavity during systole and a valve leaflet thickness of at least 5 mm for classical MVP.[13] Further MVP was classified into mild, moderate, and severe based on the degree of billowing of MV leaflets into the LA.

TTE assessment of MR

The area of the regurgitant jet was measured using the proximal iso-velocity surface area method. The left ventricular ejection fraction and left ventricular end-diastolic dimension help to determine the severity of the disease. Besides, the vena contracta method used the width of the regurgitation jet to classify the patients into mild (<0.3 cm), moderate (0.3–0.6 cm), and severe (>0.6 cm), according to the recent American Society of Echocardiography Guidelines.[14]

Statistical analysis was done using IBM SPSS 27 Statistics (IBM SPSS Statistics, Armonk, NY), with a $p < 0.05$ was regarded as significant.

The research committee of University of Al-Ameed approved the study as per the Declaration of Helsinki. The participant's consent was not sought as this study does not use personal data, human parts, or tissues.

Results

The demographic data of the sample is illustrated in Table 1. Sixty-four patients (43 females and 21 males) with TTE-confirmed MVP were included in this study. The prevalence of MVP cases in Karbala Governorate was 4.4%, MVP patients age was between 5–75 years (mean age of 39.4 ± 20.5 years; Table 2). Figure 1 shows the distribution of MVP cases according to age.

Figure 2 shows the a female predominance (67.2%) more than males (32.8%). Nonclassical

**Table 1** Demographic characteristics of the study population.

Characteristic	N (%)
Age range (years)	5–75
Gender	
Male	606 (41%)
Female	850 (59 %)
Total	1456 (100%)

Table 2   Demographic data of MVP patients.

Characteristic	Groups	N (%)
Age / Years		
	Less than 18	6 (9.4)
	18–30	25 (39.1)
	31–45	12 (18.8)
	46–60	7 (10.9)
	61–75	14 (21.9)
	Total	64 (100)
Mean age in years (Mean± SD)	**39.4 ± 20.5**	
Gender	**Total sample**	**MVP cases**
Male	606 (41%)	21 (1.4%)
Female	850 (49 %)	43 (3 %)
Total	1456 (100%)	64 (4.4%)

SD, standard deviation; MVP, mitral valve prolapse.
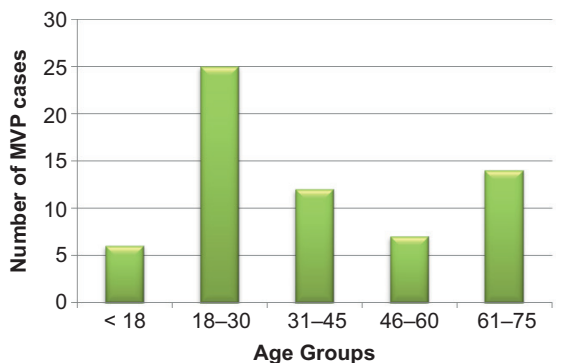
Figure 1   Distribution of MVP cases according to age groups.
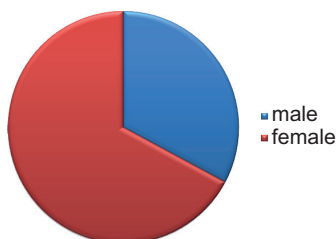
Figure 2   Distribution of MVP cases according to sex.

MVP was more common (n = 42, 66%) than the classical MVP (n = 22, 34%; Figure 3). Majority of the MVP patients had mild prolapse (n = 58, 90%), more than the moderate (n = 3, 5%) and severe MVP (n = 3, 90%; Figure 4). Figure 5 shows the results of the severity of MR associated with MVP. The occurrence of a mild degree of MR (n = 26, 40%) was
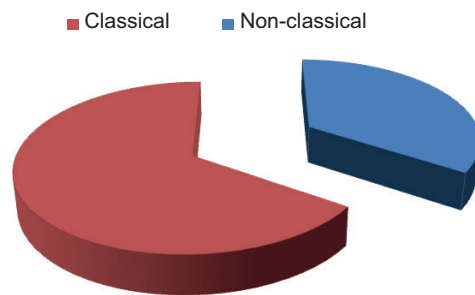
Figure 3   Distribution of MVP cases according to type (classical and nonclassical).
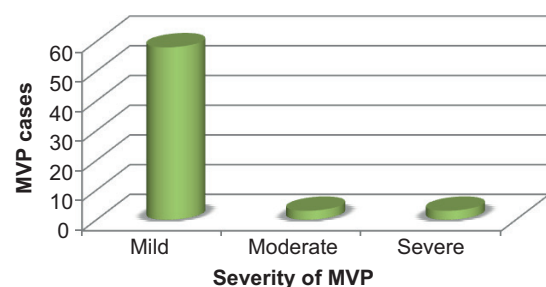
Figure 4   Distribution of MVP cases according to severity.
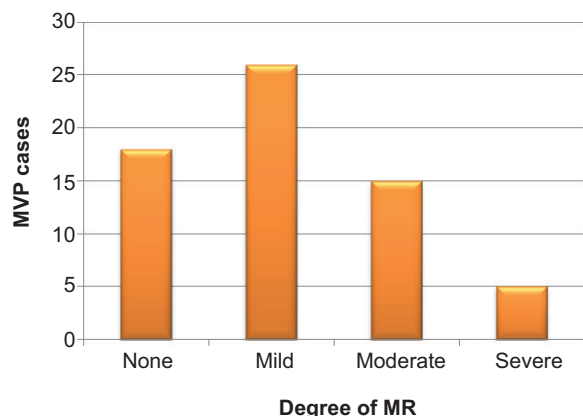
Figure 5   Degree of MR in MVP cases.

higher than no MR (n = 18, 28%), moderate MR (n = 15, 23%), and the severe MR (n = 5, 8%).

Clinical presentations of MVP patients

The most common presentations were chest pain (n = 33, 51%) and SOB (n = 32, 50%) . Both palpitations and fainting were reported in three patients (4.6 %), while arrhythmia was reported in only two patients (3.1%; Figure 6). Patients were also exhibited more than one symptom.
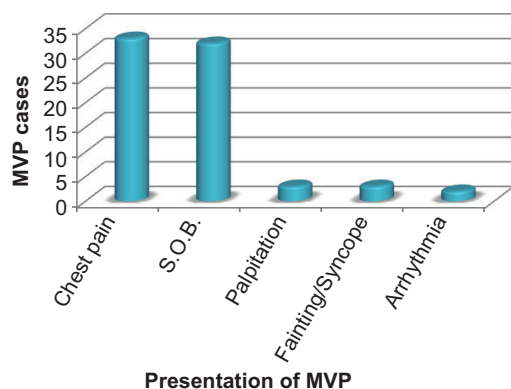
Figure 6 Clinical presentation of MVP patients.

Table 3 The relation between MVP prevalence types with age.

MVP type	Age (mean age ± SD)	P value
Classical	29.4 ± 9.8	0.0036
Nonclassical	44.7 ± 23.1	

SD, standard deviation; MVP, mitral valve prolapse.

Tables 3 and 4 show the study of the relationship between MVP types and different variables. MVP types were significantly related to age. The classical MVP was predominant at a younger age (mean = 29.4 ± 9.8 years), while nonclassical MVP

Table 4 The relationship of MVP types with different variables.

Variables	Classification	MVP type			P value
		Classical	Non-Classical	Total	
Age	<18	3	3	6	0.002
	18–30	13	12	25	
	31–45	4	8	12	
	46–60	2	5	7	
	61–75	0	14	14	
	Total	22	42	64	
Gender	Male	6	15	21	0.502
	Female	16	27	43	
	Total	22	42	64	
Severity of MVP	Mild	19	39	58	0.613
	Moderate	2	1	3	
	Severe	1	2	3	
	Total	22	42	64	
Degree of MR	None	10	8	18	0.002
	Mild	10	16	26	
	Moderate	2	13	15	
	Sever	0	5	5	
	Total	22	42	64	
Chest pain	Present	11	22	33	0.859
	Absent	11	20	31	
	Total	22	42	64	
SOB	Present	12	20	32	0.605
	Absent	10	22	32	
	Total	22	42	64	
Palpitations	Present	8	10	18	0.296
	Absent	14	32	46	
	Total	22	42	64	
Fainting/syncope	Present	2	1	3	0.234
	Absent	20	41	61	
	Total	22	42	64	
Arrhythmia	Present	0	2	2	0.306
	Absent	22	40	62	
	Total	22	42	64	

MVP, mitral valve prolapse; MR, mitral regurgitation; SOB, shortness of breath.

Table 5   Relationship of severity of MVP to different variables.

Variable	Classification	Severity of MVP				P value
		Mild	Moderate	Severe	Total	
Age	< 18	5	1	0	6	0.487
	18–30	23	1	1	25	
	31–45	12	0	0	12	
	46–60	6	0	1	7	
	61–75	12	1	1	14	
	Total	58	3	3	64	
Gender	Male	19	0	2	21	0.228
	Female	39	3	1	43	
	Total	58	3	3	64	
MVP type	Classical	19	2	1	22	0.496
	Nonclassical	39	1	2	42	
	Total	58	3	3	64	
Degree of MR	None	17	0	1	18	0.008
	Mild	25	1	0	26	
	Moderate	13	2	0	15	
	Severe	3	0	2	5	
	Total	58	3	3	64	
Chest pain	Present	30	1	2	33	0.724
	Absent	28	2	1	31	
	Total	58	3	3	64	
SOB	Present	28	2	2	32	0.703
	Absent	30	1	1	32	
	Total	58	3	3	64	
Palpitations	Present	17	0	1	18	0.547
	Absent	41	3	2	46	
	Total	58	3	3	64	
Fainting/syncope	Present	2	1	0	3	0.050
	Absent	56	2	3	61	
	Total	58	3	3	64	
Arrhythmia	Present	2	0	0	2	0.903
	Absent	56	3	3	62	
	Total	58	3	3	64	

MVP, mitral valve prolapse; MR, mitral regurgitation; SOB, shortness of breath.

was predominant in older age (mean = 44.7 ± 23.1; P = 0.0036 for both). MVP types were also seen to be strongly related to the severity of MR (P = 0.002).

No statistical relation between MVP severity and other variables like age, gender, MVP type, and presenting symptoms were recorded (Table 5).

Table 6 shows the relationship of degree of MR with different variables. The degree of MR associated with MVP was significantly related to age. Escalating MR severity was noted with increasing age, P = 0.001), MVP type (P = 0.023), and severity of MVP (P = 0.008). Presenting symptoms were not significantly associated with MR degree, except for palpitations (P = 0.002).

Discussion

The prevalence of MVP is variable in different studies, mainly due to varied samples, calculations, imaging techniques, and diagnosis criteria.[15] In this study the prevalence of MVP in Karbala Governorate is 4.4%, which is very similar to the studies of Freed et al.[3] (3%) and Levy et al. (5%).[16]

The mean age of MVP cases in this study was 39.4 ± 20.5 years, which is similar to previous researche's.[5,17] MVP occurs in all age groups but is more predominant in young adults. The chances of the disease increase with age probably, due to degenerative changes in the MV leaflets.

Table 6 Relation of degree of MR to different variables.

Variable	Classification	Degree of MR					P value
		None	Mild	Moderate	Severe	Total	
Age	< 18	1	5	0	0	6	0.001
	18–30	13	9	2	1	25	
	31–45	0	7	4	1	12	
	46–60	3	0	3	1	7	
	61–75	1	5	6	2	14	
	Total	18	26	15	5	64	
Gender	Male	3	10	7	1	21	0.252
	Female	15	16	8	4	43	
	Total	18	26	15	5	64	
MVP type	Classical	10	10	2	0	22	0.023
	Non classical	8	16	13	5	42	
	Total	18	26	15	5	64	
Severity of MVP	Mild	17	25	13	3	58	0.008
	Moderate	0	1	2	0	3	
	Severe	1	0	0	2	3	
	Total	18	26	15	5	64	
Chest pain	Present	7	16	8	2	33	0.495
	Absent	11	10	7	3	31	
	Total	18	26	15	5	64	
SOB	Present	7	17	6	2	32	0.255
	Absent	11	9	9	3	32	
	Total	18	26	15	5	64	
Palpitations	Present	11	4	2	1	18	0.002
	Absent	7	22	13	4	46	
	Total	18	26	15	5	64	
Fainting/syncope	Present	1	1	0	1	3	0.343
	Absent	17	25	15	4	61	
	Total	18	26	15	5	64	
Arrhythmia	Present	0	1	1	0	2	0.718
	Absent	18	25	14	5	62	
	Total	18	26	15	5	64	

MVP, mitral valve prolapse; MR, mitral regurgitation; SOB, shortness of breath.

Females with MVP predominate our study, which agrees with majority of medical pieces of literatures.[18,19]

Our study showed that the nonclassical MVP is more common than the classical MVP. This data contradicts the outcomes of the study of Freed et al.[3] that needs further evaluation.

The vast majority (90%) of MVP patients in our study had mild prolapse. The distinction of MVP into mild, moderate, and severe is difficult and arbitrary. Besides, this criterion is not listed in the TTE guidelines for MVP diagnostic. But we observed wide variation in the degree of prolapse and have hence tried to give the approximate insight on

it. So, this can be our study limitation. But it can be considered in the TTE criteria of future MVP assessment.

The pathology of MVP is related to MR, which might cause massive cardiac sequelae that require surgery. In this study, only 28% of MVP patients had no MR. The rest had MR with MVP, and the predominant being mild MVP (40%). The exact reason for the MVP symptoms occurrence is not known. The main probable causes can be MR itself or the tension on papillary muscles due to the prolapse.[20] But most of the patients in this study have either mild or no MR that are both essentially

asymptomatic. The severity of MR was strongly related to age (implicating escalating severity with increased age), MVP type, and severity of MVP (more severe prolapse results in more severe MR).

The most common clinical presenting symptoms were chest pain and SOB in about 50% of the patients. Other clinical signs like palpitations, syncope/ fainting, and arrhythmia were less frequent. These implicated a more benign nature of MVP than previous studies. The severity of the MR was associated with palpitations, which might be due to chamber dilation especially, in the LA.

Only a few studies on the MV and MVP were conducted in Iraq. Given the paramount importance of MV in cardiac pathology, more collaboration studies with health, academic centers, and multicenter research is required.

Study limitations

- Single center analysis.
- The study was limited only to symptomatic patients who visited the cardiology department.

Conclusion

MVP is a leading disorder worldwide. The prevalence of MVP in our study is similar to that reported in other previous studies. It has a female preponderance and is chiefly found in young adults. Nonclassical MVP is more common and tends to occur in older age than the classical MVP. The most common presenting symptoms are chest pain and SOB. However, MVP may have a more benign nature with less potential adverse cardiac sequelae than previously reported.

Acknowledgment

Conflict of interests

The authors declare no conflicts of interests.

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Data availability

The data analyzed during this study are available from the corresponding author upon request.

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