

The Incidence of Mitral Valve Prolapse and Mitral Valve Regurgitation in Patient with Secundum Atrial Septal Defect

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Abstract

Background: Association between secundum atrial septal defect (ASD) and mitral valve disease has been recognized for many years. Noninvasive studies indicate a high incidence of mitral valve prolapse (37-70 percent) in these patients. Change of left ventricular geometry in atrial septal defect had been showed were associated with degree of mitral valve prolapse. This study delineates the incidence of mitral valve prolaps and mitral regurgitation in adult patients with secundum atrial septal defect and association with age at onset and size defect.

Method: This study was a substudy from ASD registry in Dr. Sardjito General Hospital. The records of 103 adult patients ranged in age from 17 to 76 years old, with an average of 36 years old, and consisted of 16 men and 87 women who had secundum atrial septal defects demonstrated by cross sectional echocardiography between July 2012 until July 2013. Echocardiographic examinations were performed with the patient in the supine position. The echocardiograph was a Vivid 7. The mitral valve apparatus and mitral regurgitation was examined with long axis images, short axis image and apical four chamber view.

Result: Mitral valve prolapse was observed in 76% patients with secundum atrial septal defect. Prolaps of anterior mitral leaflet (AML) in age group younger than 35 years and older than 36 years are 38,6% and 61,4% respectively. The incidence of mitral regurgitation was 43%. Severity variance of mitral regurgitation were 31,7% mild, 7,7% moderate and 2,9% severe. Mitral regurgitation in patient with prolapse AML was 56.4%. None of the patients without mitral valve prolapse had mitral regurgitation. In patient with size defect more than 2 cm, the proportion of prolapse of AML and mitral regurgitation was higher as compared with patient with size defect less than 2 cm.

Conclusion: Incidence of mitral valve prolaps and mitral regurgitation are high in patient with atrial septal defect and increase with onset of age. Patients with larger size defect had a greater likelihood of mitral prolapse and mitral regurgitation. Onset of age and size defect might be associated with magnitude of the shunt and abnormal ventricular geometry.

Keyword: *Secundum atrial septal defect, mitral valve prolaps, mitral regurgitation*

Introduction

Atrial septal defect (ASD) is the most common congenital heart disease encountered in adult population. This defect result in shunt from left to the right of the heart which consequence of volume overload in right heart. The volume overload influences the position and the size of interventricular septum.¹ The association between secundum ASD and deformity in mitral valve has been recognized. Several studies show high prevalence of mitral valve prolaps, approximately 37% - 70% . Mitral valve prolaps relate with mitral regurgitation. In ASD patients, the incidence of clinically significant mitral regurgitation is rare as compared to mitral valve prolaps.² The prevalence

of mitral regurgitation is less than 10% of adult patients with large secundum ASD.³

The cause of mitral regurgitation associated with secundum ASD can be classified into extrinsic and intrinsic factors. Extrinsic factor is associated with rheumatic valve disease or infective endocarditis, whereas the intrinsic factor is related with ASD itself which cause mitral valve regurgitation.⁴

The deformity of mitral valve is associated with the change of ventricular geometry in patient with ASD. Chronic dilatation of right ventricle due to volume overload result in enlargement from basal into apical dimension as well as from lateral into septal dimension of right ventricle. It result in the displacement of right ventricular apex to the left

replacing the apex of left ventricle as true apex of the heart. This ventricular dilatation is influenced by the flow from left to right. The aim of this study is to investigate the incidence of mitral valve prolaps and regurgitation in patients with ASD and analyse the impact of age and the size of defect on mitral valve prolaps and regurgitation.

Method

The study is a cross sectional study. This study is a sub study from the ASD-PH registry in Dr. Sardjito Hospital which is conducted since 2012. The time of this study is from July 2012 until July 2013. The subjects are 103 patients registered in the registry. All subjects are examined with transthoracic echocardiography (TEE) by Vivid 7 echo machine with standard technique and view. The defect size, the presence of mitral valve prolaps and mitral regurgitation are documented. The age group is assigned with cut-off point of 35 years. The size of defect is assigned with cut-off point of 2 cm.

The statistics analysis is performed to compared variables between groups. The incidence of mitral valve prolaps and mitral regurgitation is shown in percentage. Patients age and size of defect are presented as categorical variable based on cut-off point. Descriptive analysis is performed to compare and associate between mitral valve prolaps and mitral regurgitation with age and size of defect.

Result

The subjects of this study range from 17 years old to 76 years old with mean age is 36 years. It consists of 16 males and 87 females. The mean size of defects is 2.5 cm. Anterior mitral valve prolaps is observed in 76% and mitral regurgitation in 43%. The mitral regurgitation occurs in 56.4% in patients with mitral valve prolaps, In this study, none of the subjects has mitral regurgitation alone without mitral valve prolaps.

In subjects with the size of defects ≥ 2 cm, the incidence of mitral valve prolaps and mitral regurgitation is higher as compared to those with the size of defetcs < 2 cm. The incidence of mitral valve prolaps is 78.2% and mitral regurgitation is 79.5% in subjects with defect ≥ 2 cm, in the latter the mitral valve prolaps incidence is 20.5% and mitral regurgitation is 20.5%. The proportion between two subject groups is shown in figure 1

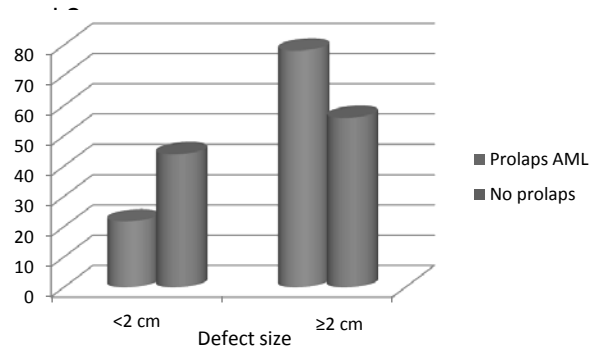


Figure 1. Incidence of mitral valve prolaps based on ASD defect size

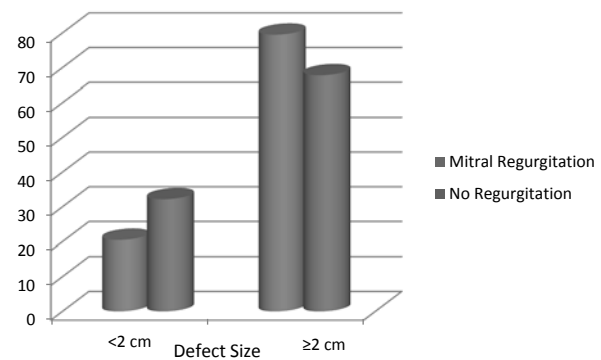


Figure 2. Incidence of mitral regurgitation based on ASD defect size

In subjects with age ≥ 36 years old, the proportion of mitral valve prolaps and mitral regurgitation is higher as compared with subjects ≤ 35 years old. The incidence of mitral valve prolaps is 79.2% and mitral regurgitation is 61.4% in subjects ≥ 36 years of age. Whereas, the incidence of mitral valve prolaps in subjects ≤ 35 years old is 72.7% and mitral regurgitation is 38.6%. The proportion between two subject groups is shown in figure 3 and 4.

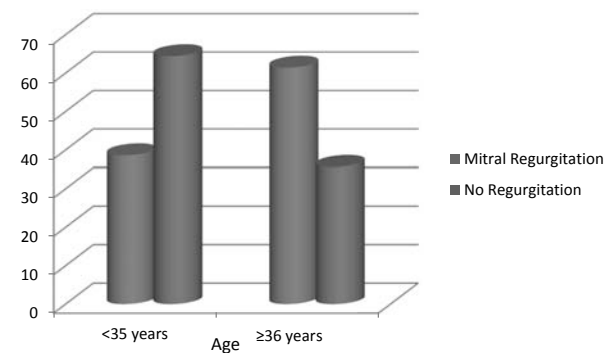


Figure 3. Incidence of mitral valve prolaps based on age

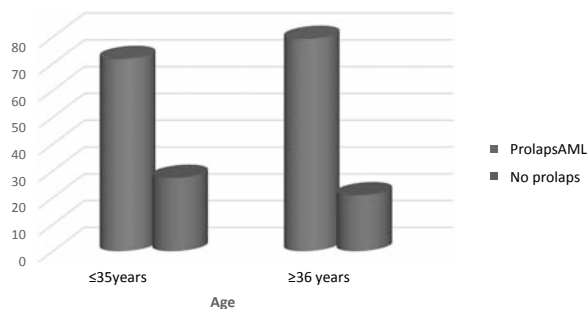


Figure 4. Incidence of mitral regurgitation based on age

Discussion

The incidence of mitral valve prolaps in general population based on echocardiography examination is approximately 5%. Mitral regurgitation associated with mitral valve prolaps occurs in around 0.01%-0.02%. Several heart defects associated with mitral valve prolaps, such as secundum ASD.⁵ Several studies reported high incidence of mitral valve prolaps accompanied ASD, which was 37-70%. This mitral valve prolaps also associated with mitral regurgitation.² None of the patients in the study showed lone mitral regurgitation without mitral valve prolaps.

Previous study shows ASD patients with mitral valve prolaps have smaller left ventricular volume, larger size of defect and older ages.³ Mitral regurgitation seemed to be associated with increasing age.² Mitral valve prolaps occurs significantly higher in patients with age more than 35 years old than those younger and very rarely in children.⁶ Our study shows the incidence of mitral valve prolaps and mitral regurgitation is higher in subjects with ≥ 36 years of age and have larger size of defects.

The etiology of mitral regurgitation associated with secundum ASD can be classified into two categories, i.e. extrinsic and intrinsic factors. Extrinsic factors associated with rheumatic valve disease and infective endocarditis. Intrinsic factor is caused by ASD itself which result in mitral regurgitation⁴. There are two hypothesis related to high incidence of mitral valve prolaps in ASD. Firstly, the prolaps is a manifestation of anatomic changes due to congenital defect in fibrous tissue. Secondly, the prolaps is acquisital changes due to left ventricle geometry changes. The closure of ASD defect may cause the changes of left ventricle geometry which is shown by significant reduction of right ventricle volume and rapid increase in left

ventricle volume.⁷ The changes in left ventricle geometry is associated with the reduction of mitral valve prolaps degree.⁷ The ASD closure causes improvement in mitral valve prolaps and reduction of mitral regurgitation degree in the majority of patients.³ In this study, the incidence of mitral valve prolaps and mitral regurgitation is higher in patients with larger defect size. This is associated with the higher flow of shunt which can influence the changes in ventricle geometry.

Conclusion

The incidence of mitral valve prolaps and mitral regurgitation is high in secundum ASD. Mitral regurgitation in ASD is associated with mitral valve prolaps. The incidence is increasing with increased age and larger defect. The age and defect size affects mitral valve pathology may be due to higher flow and the changes in ventricle geometry.

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