Two cases of parachute tricuspid valve confirmed by three-dimensional echocardiography

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Case Report

Abstract

BACKGROUND: Parachute tricuspid valve is a rare congenital malformations explained in the literature. In most cases, this malformation coexists with other congenital defects. The importance of this condition depends on its functional consequences.

CASE REPORT: First case was a 52-year-old female patient presented with palpitation. She had a history of paroxysmal supraventricular tachycardia. Transthoracic echocardiography revealed large secundum type atrial septal defect and all the tricuspid valve leaflets appeared to be connected to a single calcified papillary muscle in right ventricle suggestive of parachute tricuspid valve. Echocardiography showed severe right ventricle and right atrial enlargement, and moderate to severe tricuspid regurgitation without significant tricuspid stenosis. Another case was a 30-year-old female patient referred for echocardiography prior to her breast cancer chemotherapy. Transthoracic echocardiography revealed a right ventricle with an unusual fusion of papillary muscles resulting in a single calcified head for the attachment of all tricuspid leaflets. These findings were suggestive of a parachute-like tricuspid valve. Other data were mild to moderate tricuspid regurgitation without any stenosis, and normal right ventricle size and function. In both cases, parachute tricuspid valve was confirmed by three dimensional echocardiograph.

CONCLUSION: In our first case, parachute tricuspid valve was associated with atrial septal defect, although in the second case, no associated anomaly was detected, a condition not previously reported in the literature. In both cases, parachute tricuspid valve was not associated with tricuspid stenosis. Based on other published cases, parachute involvement of the tricuspid valve is less often reported than cases involving the mitral valve. Additionally, the associated consequences in tricuspid valve position such as tricuspid stenosis seem to be less significant than cases involving mitral valve. It is recommended that in patients with tricuspid valve involvement, parachute anomaly should be considered as a possible rare cause.

Keywords: Tricuspid Valve, Congenital Abnormalities, Atrial Septal Defect, Echocardiography

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Introduction

Isolated congenital malformations of the tricuspid valve are relatively rare. In most cases, these malformations coexist with other associated defects. The importance of this condition and related symptoms depends on functional consequences such as tricuspid regurgitation and/or stenosis and presence of other associated lesions.

A parachute deformity is one of these congenital malformations. It occurs when the chordae tendineae arise from a single papillary muscle or muscle group.[1] This type of deformity may involve one or both atrioventricular valves.

The first case involving parachute deformity of tricuspid valve was confirmed in 1972 via necropsy and was published in the literature.

Our current report includes two new cases of parachute tricuspid valve that were identified and documented in the past three years in Quaem hospital in Mashhad, Iran.

Case Report

First case involves a 52-year-old female patient with chief complaint of palpitation at the time of admission to the cardiology department.

Cardiovascular examination revealed a grade

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III/VI pansystolic murmur at the right lower sternal border and fixed splitting of second heart sound.

Electrocardiogram showed non-specific ST segment and T wave (ST-T) changes.

Patient's past medical history included paroxysmal supraventricular tachycardia which was recorded in her previous palpitation attack electrocardiography.

Transthoracic echocardiography revealed large (26 mm) secundum type atrial septal defect with left to right shunt and all the tricuspid valve leaflets appeared to be connected to a single calcified papillary muscle in right ventricle suggestive of parachute tricuspid valve (Figure 1). Other findings were severe right ventricle and right atrial enlargement and moderate to severe tricuspid regurgitation without significant tricuspid stenosis. Measured systolic pulmonary pressure gradient was 47 mmHg.

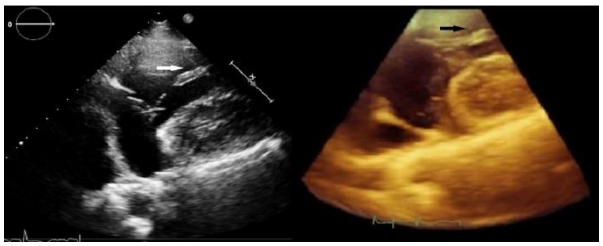

Figure 1. Transthoracic two-dimensional (left image) and three-dimensional (right image) echocardiograms in case 1, in mid-systolic time and right ventricle inflow view showing the attachment of the anterior and the septal leaflets of the tricuspid valve to a single papillary muscle (arrows)

Three-dimensional transesophageal assessment of right ventricle was also performed and parachute tricuspid valve with single papillary muscle was confirmed (Figure 2).

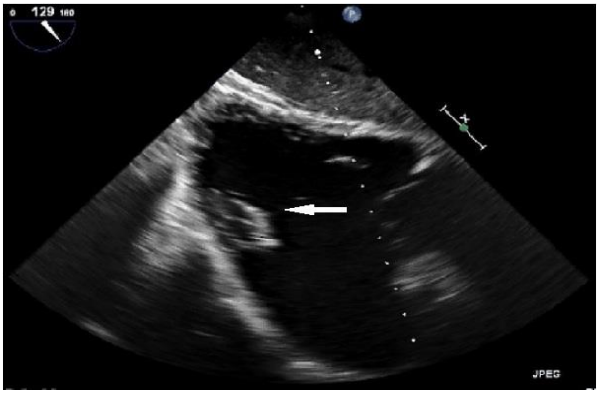

Figure 2. Two-dimensional transesophageal echocardiogram in case 1, in transgastric right ventricle view showing only single papillary muscle (white arrow)

The patient underwent atrial septal defect device closure. Transthoracic echocardiography follow-up two months later showed mild right ventricular enlargement with mild to moderate tricuspid regurgitation, without tricuspid stenosis and residual shunt.

Second case was a 30-year-old female patient referred to the cardiology department for echocardiography prior to her breast cancer chemotherapy.

Cardiovascular examination revealed a grade II/VI pansystolic murmur at the lower right sternal border.

Electrocardiogram was normal.

Transthoracic echocardiography revealed a right ventricle with unusual fusion of papillary muscles resulting a single calcified head for attachment of all tricuspid valve leaflets. These findings were suggestive of a parachute-like tricuspid valve. Other data were mild to moderate tricuspid regurgitation without any stenosis, normal right ventricle size and function without any associated anomaly (Figure 3). Parachute-like tricuspid valve was confirmed by three dimensional echocardiography (Figure 4).

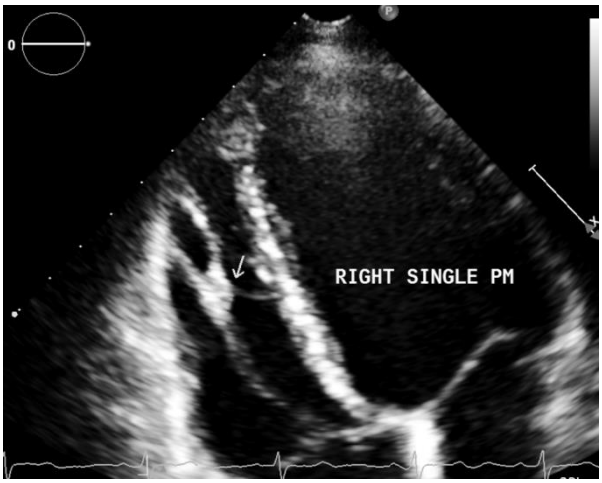

Figure 3. Transthoracic echocardiogram in case 2, in mid-systolic time and four chamber view of the right heart showing the unusual fusion of right ventricle papillary muscles (PM) resulting in a single calcified head for attachment of all tricuspid leaflets (white arrow)

We recommended follow-up echocardiography.

Discussion

Until late 2015, only six patients with parachute tricuspid valve abnormality were reported and almost all of them had other associated malformations.

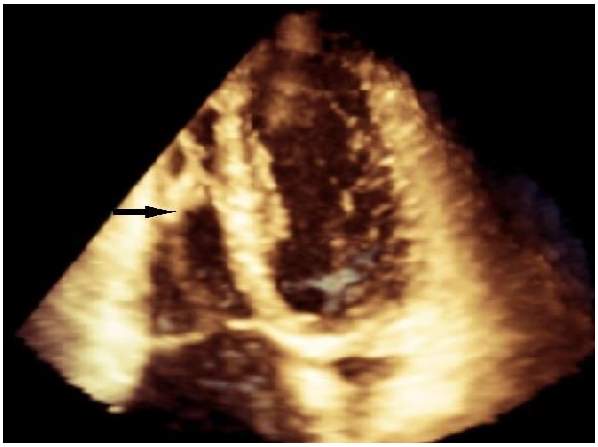

Figure 4. Three-dimensional transthoracic echocardiogram in case 1, in mid-systolic time and four chamber view of the right heart showing a single calcified papillary muscle for attachment of all tricuspid leaflets (black arrow)

First case of parachute tricuspid valve was reported in 1979 by Milo et al. whose findings included associated anomalies of double-chamber right ventricle and straddling of mitral valve in 10-week-old child.[1] In 1980 Ariza et al. described presence of parachute tricuspid valve in association with tetralogy of Fallot resulting in tricuspid stenosis.[2] Two additional cases of parachute tricuspid valve described by Marwah et al.[3] and Mohan et al.[4] were associated with atrial septal defect with or without ventricular septal defect. Neither of these two cases had tricuspid stenosis. Kurtul et al.[5] and Mohan et al.[6] reported two cases of parachute both in mitral and tricuspid valves. Mild mitral valve stenosis and normal functioning tricuspid valve at former case and moderately severe regurgitation at latter case were also noted.

In our first case, we demonstrated parachute tricuspid valve with associated anomaly (atrial septal defect) as Marwah et al.[3] and Mohan et al.[4] had reported. In our second case we did not find any associated anomalies which to our knowledge, has not been previously reported in the literature. In the first case there was no tricuspid stenosis and atrial septal defect device closure eliminated severity of tricuspid valve regurgitation. We proposed that this was due to reduction of tricuspid annular size and reduction of right ventricular volume overload. In the latter case, parachute tricuspid valve was not associated with consequences of tricuspid stenosis and significant regurgitation.

Based on published cases, parachute involvement of tricuspid valve is less common and its consequences such as tricuspid stenosis are less significant than involvement in mitral valve position.

We believe that the larger size of tricuspid valve annulus was a crucial factor in explanation of having less significant tricuspid stenosis in this position.

It is recommended that in patients with tricuspid valve involvement, parachute anomaly should be considered as a possible rare cause.

Acknowledgments

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Conflict of Interests

Authors have no conflict of interests.

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