However, there is still no consensus regarding the development of blood cysts (3-5).

Myxomatous degeneration is used in the context of mitral valve prolapse. This refers to the pathological weakening of connective tissue. In our case and also in some other reported cases, weak cardiac structures such as floppy interatrial septum, mitral leaflets, and embryological remnants like eustachian valve were reported. So these futures support embryologic origin as mentioned by Zimmerman et al. (6).

There are controversies regarding therapy for blood cysts because long-term follow-up results are absent. Surgery is the therapy of choice for blood cysts, potential source of embolism and left ventricular outflow tract obstruction, even in asymptomatic patients to discriminate from cardiac malignancies (7).

The incidence of cor triatriatum is approximately 0.1% of congenital heart malformation. Typically, the right atrial partition is due to exaggerated fetal eustachian and thebesian valves, which together form an incomplete septum across the lower part of the atrium. This septum may range from a reticulum to a substantial sheet of tissue (8, 9).

In our case, the interatrial septum was thin and floppy, and the large eustachian valve membrane divided the right atrium into two (cor triatriatum dexter) (Fig. 1b). Complete persistence of the right sinus valve results in a separation between the smooth and trabeculated portions of the right atrium, resulting in cor triatriatum dexter. Both blood cyst and cor triatriatum dexter have not been described in echocardiographic literature before. However, Dencker et al. (4) described mitral cysts in both the anterior and posterior leaflets and incomplete cor triatriatum sinister.

According to some case reports, depending on which area of the heart is affected, blood cysts may result in a variety of clinical phenomena, including embolism, valvular dysfunction, and heart block (7, 10).

Conclusion

Blood cysts are rarely reported, so there is no consensus or guidelines for the optimal management of asymptomatic cases. Annual follow-up with echocardiography is our choice for this patient.

Video 1. Transthoracic echocardiographic image showing a blood cyst on the anterior leaflet of the mitral valve (parasternal long-axis view)
Video 2. Transesophageal echocardiographic image showing a blood cyst on the anterior leaflet of the mitral valve
Video 3. TEE demonstrates mitral regurgitation at the coaptation point of the anterior leaflet. The cyst causes the coaptation defect
ECG - electrocardiography; TEE - transesophageal echocardiography

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Hybrid approach of percutaneous mitral valve repair with the MitraClip followed by off-pump coronary artery bypass grafting

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Introduction

The management of patients with concomitant severe ischemic mitral regurgitation (IMR) and coronary artery disease is challenging. The combined surgical approach is burdened by a high risk of morbidity and mortality, especially in the presence of severe left ventricular systolic dysfunction (1). However, mitral valve repair with MitraClip® (Abbott Vascular, Santa Clara, CA, USA) is a new and promising therapeutic option that has recently been introduced as an alternative approach in patients who have a high risk for mitral valve surgery. Although the hybrid approach is a theoretically possible technique in the treatment of patients with concomitant coronary artery disease and severe IMR and who are at a high risk or unsuitable for conventional surgery, to the best of our knowledge, there is no published case available on the use of this technique.

Case Report

A 68-year-old man with a history of atrial fibrillation, stroke in 2010, myocardial infarction, and heart failure for the preceding two months was referred to our hospital because of symptomatic severe IMR and

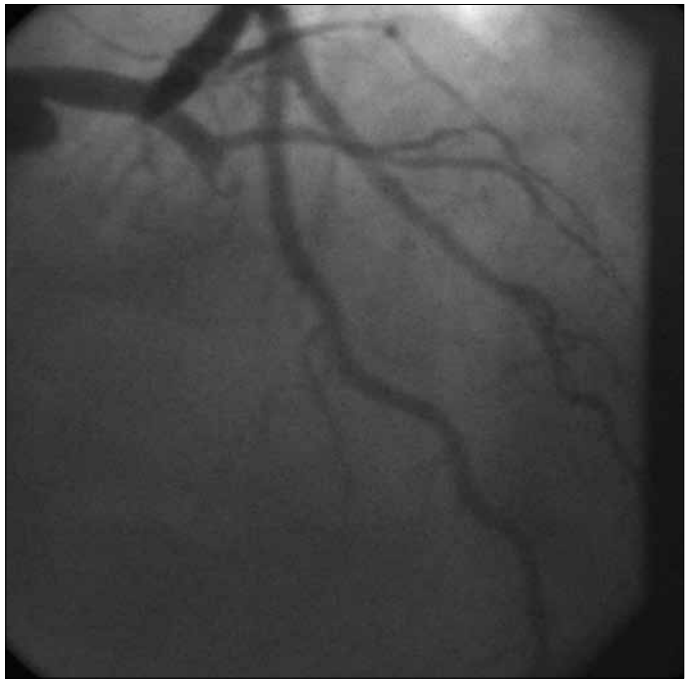

Figure 1. Coronary angiography shows a total occlusion of the proximal left anterior descending artery in right anterior cranial view

single-vessel coronary artery disease. He was in New York Heart Association functional class III dyspnea, and he reported lung edema at least four times recently.

In another hospital, transthoracic echocardiography showed a left ventricular ejection fraction of 20%. Coronary angiography showed a total occlusion of the proximal left anterior descending artery (LAD) (Fig. 1; Video 1) with retrograde filling from the right coronary artery with a collateral circulation (Video 2) and 30% stenosis of the circumflex artery. After two different departments of cardiac surgery refused to operate the patient because of high-risk nature of surgery, a cardiology department decided to open the total LAD lesion, but they were unable to pass it.

At our hospital, transthoracic echocardiography showed a dilated left ventricle with depressed systolic function, severe IMR, and mild tricuspid regurgitation (left ventricular end-systolic diameter was 58 mm, and pulmonary artery systolic pressure was 65 mm Hg). Transesophageal echocardiography demonstrated severe IMR from the middle segments of both leaflets (A2 and P2 segments, vena contracta: 0.7 cm) (Fig. 2) (Videos 3-4).

The calculated logistic Euroscore was 28.7%. All myocardial regions including the anterior wall segments were viable according to single-photon emission computed tomography. Given these findings, the case was discussed by our heart team. Because of the high predicted risk of the combined surgical approach and hemodynamic instability, the hybrid approach with MitraClip® followed by off-pump coronary artery bypass graft surgery (CABG) was planned. The sequence of interventions can be debated, but in our case, we thought that severe mitral regurgitation (MR) was a major cause of resistance heart failure and lung edema.

MitraClip® was performed as previously described (2-4). The MitraClip® system was directed toward the origin of the regurgitant jet mainly between the A2 and P2 scallops and was advanced into the left ventricle. The echocardiographic result was satisfactory as MR was

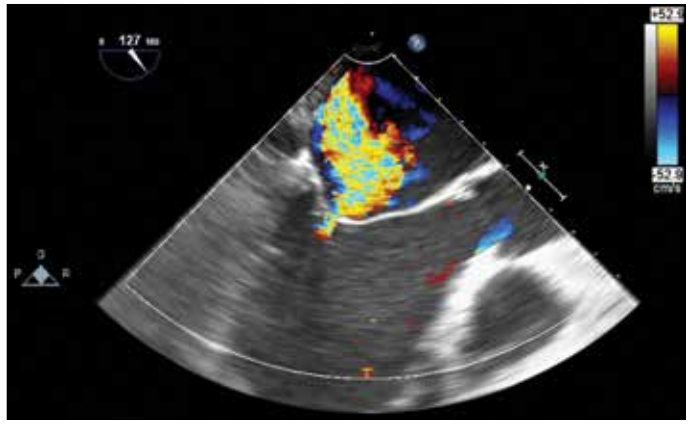

Figure 2. Transesophageal echocardiography reveals severe mitral regurgitation from the middle segments of both leaflets (A2 and P2 segments) in the left ventricular outflow tract view

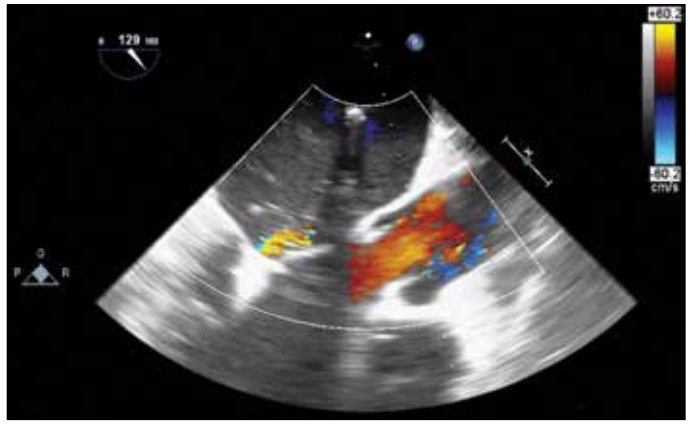

Figure 3. Postprocedure transesophageal echocardiography shows a resolution of the severe mitral regurgitation in the left ventricular outflow tract view

reduced from severe to trivial (Fig. 3; Video 5). A month later, off-pump left internal mammary artery to LAD artery by-pass was performed.

Discussion

IMR is associated with a high mortality rate. If IMR is severe, the prognosis is poor, and the one-year mortality rates could be as high as 40% (5, 6). Most studies showed that severe IMR is not usually improved by revascularization alone and that the persistence of residual MR carries an increased mortality risk (7). The usual treatment of patients with coronary artery disease and severe IMR involves combined CABG and mitral valve operation with repair or replacement. In a large series of patients from the New York Cardiac Surgery Reporting System, the observed mortality rate for isolated valve surgery was 4.4% versus 9% for valve and concomitant coronary surgery (8).

In our case, hybrid treatment was selected because of the high-risk nature of the combined surgical approach. The hybrid concept has been applied in various clinical conditions for parsing the total risk of a single major procedure to a lesser individual risks of two smaller procedures (9, 10). Therefore, the hybrid strategy to dissociate the procedures into two smaller, staged procedures MitraClip® and CABG may be worthy of consideration in some selected cases. We believe that growing experience with MitraClip® will broaden clinical indications for its

use. In the future, the hybrid approach may become a treatment option in the management of severe IMR and coronary artery disease. Thus, the complexity of a major procedure may be lowered in some selected no-option patients.

Conclusion

This report shows that the hybrid approach with MitraClip® and CABG could be a safe, feasible, and effective alternative therapeutic strategy in patients with concomitant severe IMR and coronary artery disease.

Video 1. Coronary angiography shows a total occlusion of the proximal left anterior descending artery
Video 2. Coronary angiography shows retrograde filling of the total occluded proximal left anterior descending artery from the right coronary artery with a collateral circulation
Video 3. Transesophageal echocardiography shows severe mitral regurgitation from the middle segments of both leaflets (A2 and P2 segments) in the central four-chamber view
Video 4. Transesophageal echocardiography demonstrates severe mitral regurgitation from the middle segments of both leaflets (A2 and P2 segments) in the left ventricular outflow tract view
Video 5. After two clips were implanted between the central scallops, postprocedure transesophageal echocardiographic evaluation shows resolution of the severe mitral regurgitation in left ventricular outflow tract view

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Treatment of left main shock syndrome with percutaneous coronary intervention in the absence of an advanced left ventricular assist device or ECMO

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Introduction

Acute total occlusion of the unprotected left main coronary artery (LM) results in cardiogenic shock, or left main shock syndrome (LMSS), in the majority of affected patients (1). The prognosis of the subset of patients with LMSS and complete occlusion is dire, with up to 100% mortality (2).

In this paper, three patients with LMSS who underwent percutaneous coronary intervention (PCI) alone or PCI with the implementation of IABP were included. We have discussed how to approach a patient with LMSS on diagnosis and transfer and its treatment in the absence of advanced LV assist devices or ECMO.

Case Reports

Case 1

A patient with a direct crossover LM-to-LAD stent had a sudden onset of chest pain at our outpatient clinic. His ECG showed ST-segment elevation of D1 and aVL (Fig. 1). We observed an acute complete occlusion of LM, which resulted from subacute thrombosis of the crossover LM-to-LAD stent. Ventricular fibrillation (VF) occurred during the introduction of a 2.0×20-mm catheter balloon (Invader, Alvi Medica Co). Because the balloon catheter was already at the tip of the JL4 guiding catheter, we first inflated the balloon at 8 atm. Then, we attempted to convert VF and observed that it already spontaneously recovered to sinus rhythm after balloon dilatation. Later, a 3.5×15-mm bare metal stent (BMS, Integrity, Medtronic Co.) was inserted to the proximal portion of the previous stent with a final kissing balloon (2.0×20 mm and 3.5×20 mm; Invader, Alvi Medica Co) in LAD and the left circumflex artery (LCx). During the procedure, three VFs and one pulseless ventricular tachycardia (VT) were converted to sinus rhythm via a defibril-