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Case Report Open Access

Mitral valve replacement one month after coronary artery bypass grafting: Two unexpected cases in a row

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ABSTRACT

Redo cardiac surgery in patients with cardiac operations is a burden for both the patients and surgeons. Difficulties in exploration and further myocardial damage in recurrent operations are the main issues. Patients with recent operations pose another high-risk group. Herein, we presented two patients, a 67-year-old male and a 45-year-old male, who required mitral valve replacement surgery four weeks after surgical coronary revascularization due to pulmonary edema. The first patient had poor left ventricular functions and was operated on with beating heart surgery with cardiopulmonary bypass via mini anterior thoracotomy. The other patient was operated on with a conventional method.

Keywords: Cardiac surgical procedures, reoperation.

Reoperations in cardiac surgery have always been a challenge and have been included as a major risk factor in EuroSCORE II, which is the most commonly employed risk stratification method in cardiac surgery.[1] Not only do fibrous adhesions, exploration, and cannulation issues make it difficult, but a second intervention on the heart also increases the risk. Furthermore, a second intervention on the heart increases the risk.[2] Reoperation within short intervals is more problematic and places additional burden on the surgeon.

In patients with ischemic mitral regurgitation (IMR), simultaneous mitral valve intervention during coronary revascularization still remains controversial. Residual mitral regurgitation remains higher in unintervened patients. However, the left ventricular end systolic volume index and two-year mortality are insignificantly different.[3] Progression may be unpredictable, and redo interventions may be necessary.

Herein, we presented two patients who required mitral valve replacement (MVR) surgery four weeks after surgical coronary revascularization.

CASE REPORT

Case 1- A 67-year-old male patient was admitted with signs and symptoms of pulmonary edema. The patient had bilateral pleural effusion and underwent bilateral Pleurocan catheter (Pleuracan, B. Braun Group, Melsungen, Germany) placement. The medical history revealed a five-vessel bypass surgery in another center four weeks before admission. The procedure was performed as salvage surgery due to cardiac arrest. Preoperative echocardiography documented moderate to severe IMR, but since it was a salvage surgery, mitral pathology was ignored.

Following pulmonary edema treatment, echocardiography revealed poor left ventricular functions (ejection fraction [EF] of 30 to 35%), severe IMR, and a pulmonary artery pressure of 70 mmHg. Beating heart MVR via right anterolateral thoracotomy on the fifth intercostal space was performed. Normothermic cardiopulmonary bypass CPB (36 to 37°C) was established following femoral arterial and femoral and right internal jugular venous cannulation with a flow rate of 2.2 L/min/m^2.

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The mean arterial pressure was maintained between 65 and 80 mmHg. The aorta was not cross-clamped, no cardioplegia was used during the procedure, and the heart was allowed to beat. The patient was kept in Trendelenburg position throughout the procedure while the aortic root was vented to prevent any possible air embolism. The adequacy of the myocardial perfusion was confirmed by ECG monitorization. Standard left atriotomy incision was made. Both leaflets were fibrotic, and the annulus was severely dilated. The leaflets were left in place. The mitral valve was replaced with a 29-mm Carpentier-Edwards pericardial bioprosthesis (Baxter Healthcare Corp., Edwards Division, Santa Ana, California, USA). De-airing maneuvers were performed prior to the cessation of CPB. The CPB time was 120 min. The patient was weaned from CPB with intra-aortic balloon counterpulsation and milrinone support. He was kept intubated for four days for low cardiac output, and the balloon was withdrawn at the end of six days. The patient was followed in the intensive care unit for 11 days and was discharged on the 28th postoperative day with an EF of 30% and pulmonary artery pressure of 35 mmHg. A written informed consent was obtained from the patient.

Case 2- A 45-year-old male patient was admitted with signs and symptoms of pulmonary edema. The patient's medical history revealed a two-vessel bypass surgery three weeks before admission in another center. The patient also had sternal dehiscence and open superficial sternal wound infection being treated with vacuum-assisted closure therapy. The patient was on broad spectrum antibiotics for 10 days. Preoperative echocardiography in our hospital documented severe IMR. Prior to first operation in the outer center, moderate to severe IMR was reported, and the surgeon there ignored it and did not intervene mitral valve. Left ventricular functions were normal, and the pulmonary artery pressure was 40 mmHg. Blood and tissue culture results were negative. The median sternotomy approach was preferred, with simultaneous debridement of all necrotic and infected tissues. Mitral valve replacement (31-mm SJM mechanical prosthesis; St. Jude Medical Inc., St. Paul, Minnesota, USA) was performed under cardioplegic arrest. The patient was weaned from CPB with norepinephrine. Fibrotic tissue adhesions caused difficulties during surgery. The sternum was repaired. The patient was extubated 8 h postoperatively and was kept in the intensive care unit for two days. The patient was discharged on the seventh postoperative day. A written informed consent was obtained from the patient.

DISCUSSION

Not intervening IMR simultaneous with coronary revascularization has no effect on mortality, but in this case, further interventions for progressing IMR may be required in time. Intervened patients had higher rates of freedom from at least moderate IMR and redo intervention at even 15 years (38% *vs.* 89%).[3] Moreover, intervened patients had significantly more reduction in lower left ventricular end diastolic diameter, higher EF, lower NYHA (New York Heart Association) functional class, and lower rates of rehospitalization.

In echocardiographic examination of patients with IMR, while quantifying effective regurgitant orifice area (EROA) and regurgitant volume, lower thresholds may be accepted to define severe regurgitation. In patients with low cardiac functions, the total forward left ventricular stroke volume is lower, and this may lead to a lower estimated regurgitant volume (<60 mL/beat). Therefore, calculation of regurgitant fraction could account for lower flows and has shown prognostic implications. Moreover, the crescentic shape of the regurgitant orifice, characteristic of IMR may lead to underestimation of the vena contracta width and of the EROA. An EROA >30 mm^2 by two-demensional proximal isovelocity surface area likely corresponds to severe IMR.[4]

In the two cases we presented, the situation was likely different. In the first patient, since the patient was operated on as salvage surgery, the primary aim was to keep the patient alive. Therefore, the decision not to intervene with the mitral valve had a rationale. In the second patient, we believe that echocardiographic examination prior to CABG underestimated IMR. Therefore, in both patients, the reason for reintervention was not the progression of IMR. The challenge for the first case was low EF, in addition to the recent cardiac operation. Therefore, we preferred beating heart MVR via mini right anterior thoracotomy. It has been documented that beating heart mitral valve surgery in low cardiac function patients improves outcomes.[5] Global myocardial ischemia and reperfusion injury are avoided, and difficulty in weaning from CPB may be lessened.[5] Moreover,

less invasive nature of the method we employed eased postoperative recovery.

In the second case, since the patient had sternal dehiscence and superficial open wound infection, the most rational approach would be resternotomy, debridement of infected tissues, and repair of the sternum. The criticism could be the risk of infective endocarditis with the sternotomy approach due to inoculation from infected tissues. However, the tissue and blood culture tests were negative, and the patient was on antibiotherapy for two weeks prior to surgery.

Since both patients had severe symptomatic IMR according to the guideline-determined echocardiographic results, surgery was indicated in both patients based on the decision of the heart team. When discussing the advantages and disadvantages of repair in these patients, it is prudent to state that replacement in both cases represents definitive therapy, taking into consideration that both patients had their second heart surgery with CPB within one month. Furthermore, avoiding repair may reduce the likelihood of reintervention.

In conclusion, we believe that redo cardiac surgery in patients with recent cardiac operations is a burden for both the patients and surgeons. The best way is avoidance by meticulously performing preoperative imaging modalities, particularly echocardiographic examinations. Moreover, the decision to intervene in IMR should be cautiously made based on guideline suggestions. If such interventions are needed, we believe that beating heart mitral valve surgery in low cardiac function patients may be the best solution to improving outcomes.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept, design, control/supervision, data collection/processing, analysis/interpretation, literature review, writing article, critical review, references, materials: A.B.D., H.A.G.

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