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## Re-operation for the mechanical valve obstruction with a beating heart technique in an elderly patient with compromised ventricular function

### *Bozulmuş ventrikül fonksiyonlu yaşlı hastada çarpan kalp tekniği ile mekanik kapak obstrüksiyonu için reoperasyon*

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#### Introduction

Conventional mitral valve replacement (MVR) consists of cardiopulmonary bypass (CPB), cross-clamping, and cardioplegia. Reperfusion injury is a phenomenon that can occur in classic technique (1). Beating heart valve surgery by perfusing the heart continuously with blood eliminates the ischemia and avoids reperfusion injury. In addition, this technique may have other advantages, as the heart is under more physiologic condition than the cardioplegic arrested state especially in patients who have compromised ventricular functions (2-4).

#### Case report

An 85 years old male patient admitted with symptoms of dyspnea and palpitation. He underwent MVR operation 2 years ago.

No mechanical valve sounds were detected during cardiac auscultation. Patient was in NYHA functional class III. Electrocardiography revealed atrial fibrillation and bilaterally lung edema observed on chest X-ray. Echocardiography showed 13/6 mmHg peak/mean mitral diastolic gradient, and no leaflet motion on the prosthetic valve. Also, ejection fraction (EF) was calculated as 30% and pulmonary artery pressure (PAP) was measured as 60 mmHg. During X-ray scope examination no leaflet motion was observed.

Emergency re-operation was performed. Before the re-median sternotomy, femoral artery and vein were explored. Aortic and bi-caval

cannulation were performed. Coronary sinus (CS) and right upper pulmonary vein were also cannulated. Operation was started with the use of standard CPB without cross-clamping the aorta. Pulmonary vein was continuously vented. When the patient was put in the Trendelenburg position, the left atrium was opened. We observed that the leaflets of prosthesis were stuck. During excision of the valve and the left atrial thrombectomy aorta were clamped and continuous retrograde CS perfusion with oxygenated warm blood was started. Retrograde CS perfusion rate was kept between 400-500 ml/min and perfusion pressure kept between 50-60 mmHg. Possible myocardial ischemia was monitored electrocardiographically and with measuring of blood gas changes of the returned blood from the aortic venting in every 10 minutes during CS perfusion. Prosthetic valve was excised and bileaflet mechanical valve was replaced. After closing the left atrium and de-airing of the heart, aortic cross-clamp was released and retrograde perfusion was stopped. Weaning from the CPB occurred smoothly with 5 mcg/kg/min dopamine support. Operation was performed without any complication and there was no postoperative cerebrovascular event.

#### Discussion

Although major technological advances have been made in myocardial protection, perioperative adverse affects caused by myocardial ischemia and reperfusion injury have not been completely eliminated. Therefore, great effort is made to prevent reperfusion injury during such procedures

(5, 6). Especially cardioplegic arrest of the heart in high-risk situations as elderly patients, compromised ventricle, re-operations and high PAP may make weaning from the CPB problematic. Cardiac dysfunction may be caused by myocardial edema intrinsic to the diastolic state of the arrested heart and due to the some degree of reperfusion injury. In contrast, keeping the heart beating, results in less myocardial edema and better cardiac function (7).

The right ventricular protection, either during the retrograde cardioplegia or CS perfusion with blood is defined a problem in the literature (8). However, in comparison with other techniques, this technique has important differences that minimize this risk (2-4, 9, 10). The optimal safe perfusion pressure during retrograde CS perfusion is closely related to CS perfusion flow. Matsumoto et al. presented no complications related to retrograde CS perfusion during high pressures (60 to 80 mmHg) (2).

In this procedure, motion of the heart and removal of air may be problematic. Well decompression of the heart caused by cardiac venting resulted in quality of visual field equal to that conventional technique. De-airing was performed continuously from the aortic venting cannula until the end of the CPB. Postoperatively creatine kinase -MB levels were measured in 6, 12, 24, and 48 hours and were found to be in normal ranges. The aorta was cross-clamped for 20 minutes with the total bypass time of 95 minutes. The aortic cross-clamp time is not the ischemic time, because the heart was receiving blood all through this time period. One of the advantages of this technique is the ease of weaning patients from CPB (4).

## Conclusion

We believe that beating heart technique is a good surgical option for mitral valve disease. This technique provides more physiologic

conditions than cardioplegic arrested state. This advantage makes benefits especially for patients with compromised left ventricular functions who have high risk of myocardial injury with the conventional technique.

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