

Mitral valve replacement in beating heart through right thoracotomy: a safe option for reoperation

*Sağ torakotomi yolu ile atan kalpte mitral kapak replasmanı:
Tekrar ameliyatında güvenli bir seçenek*

İbrahim Gökşin, Ali Vefa Özcan, Münevver Dereli, Bilgin Emreca

Department of Cardiovascular Surgery, Medicine Faculty of Pamukkale University, Denizli

Resternotomy after coronary artery bypass grafting (CABG) is a highly challenging situation, especially in the presence of patent grafts. Cardiac injury, bleeding, injury of a patent graft, especially such as the internal thoracic artery, and the difficulty of resternotomy are major problems that may increase morbidity and mortality in these patients. In this article we present a 61-year-old male patient with a previous CABG surgery who had mitral valve replacement on beating heart with the aid of cardiopulmonary bypass. On-pump beating heart normothermic mitral valve replacement without cross-clamping the aorta through right anterolateral thoracotomy is a simple and safe procedure. We think that this procedure may be a good option for reoperation especially in patients with patent bypass grafts.

Key words: Beating heart; mitral valve; resternotomy; thoracotomy.

Resternotomy after coronary artery bypass grafting (CABG) is a challenging situation especially in the presence of patent grafts. Cardiac injury, bleeding, injury of a patent graft especially the internal thoracic artery (ITA), and difficulty of resternotomy are major problems that may increase morbidity and mortality in these patients. Cardiopulmonary bypass (CPB) durations, blood loss, blood product usage and ITA injury rates have been lower in patients undergoing right thoracotomy than in those undergoing resternotomy.^[1] In this case report we present a patient with previous CABG surgery who had mitral valve replacement in a beating heart with the aid of CPB.

Koroner arter bypass greftleme (KABG) ameliyatı sonrası resternotomi özellikle patent greft varlığında oldukça zor bir durumdur. Bu hastalarda kalp yaralanması, kanama, özellikle intenal torasik arter gibi patent bir greftin yaralanması ve resternotominin zorluğu morbidite ve mortaliteyi artıran en önemli sorunlardır. Bu yazıda daha önce KABG ameliyatı geçirmiş 61 yaşında bir erkek hastada kardiyopulmoner bypass altında atan kalpte yapılan mitral kapak replasmanı olgusu sunuldu. Sağ anterolateral torakotomi ile pompada atan kalpte normotermide krosklemp kullanılmadan yapılan mitral kapak replasmanı basit ve güvenilir bir işlemdir. Bu işlemin, özellikle patent bypass greftleri olan hastalarda tekrar ameliyatı için iyi bir seçenek olabileceği düşünülmüştür.

Anahtar sözcükler: Atan kalp; mitral kapak; resternotomi; torakotomi.

CASE REPORT

A 61-year-old male patient with symptoms of fatigue and tachycardia had undergone CABG [LITA-left anterior descending artery (LAD)] and AVR operation eight years ago. The patient had New York Heart Association functional class 4 symptoms. Transthoracic echocardiography showed 3-4 degree mitral insufficiency. Coronary angiography revealed a patent LITA-LAD graft, right coronary artery occlusion and left circumflex artery occlusion. The circumflex coronary artery had been interventioned and opened with percutaneous transluminal coronary angioplasty (PTCA) two months before. On operation the right

Received: May 16, 2009 *Accepted:* August 10, 2009

Correspondence: Bilgin Emreca, M.D. Pamukkale Üniversitesi Tıp Fakültesi, Kalp ve Damar Cerrahisi Anabilim Dalı, 20070 Kınıklı, Denizli, Turkey. Tel: +90 258 - 213 81 74 e-mail: bilginemreca@yahoo.com

femoral arterial, femoral venous and percutaneous right jugular venous cannulations were performed first. After right anterolateral thoracotomy the chest was entered through the fourth intercostal space. The ascending aorta and right upper pulmonary vein were continuously vented for air removal and to maintain a clear surgical field during the procedure. Surgery was performed with the use of normothermic (36° C) CPB in a beating heart without cross-clamping the aorta. Left atrial entrance was accomplished through the interatrial groove by left atriotomy. The mitral valve was fibrotic. Severe mitral regurgitation with leaflet degeneration was present. The mitral valve was not suitable for repair and mitral valve replacement was done. The posterior leaflet was preserved. A number twenty-five bi-leaflet mechanical valve (manufacturer, location) was implanted with interrupted pledgeted sutures. The CPB time was 90 minutes. Postoperative bleeding was 350 ml and early extubation was done on the fourth postoperative hour. The patient was discharged uneventfully on the seventh postoperative day without any complication.

DISCUSSION

Reoperative cardiac surgery is a challenging problem for the cardiac surgeon. It has many risks during sternal reentry besides the procedure itself. For this reason surgeons try to seek safe reentry into the chest. For this reason, thoracotomy is an option. It has a low complication rate and reduces the intensive care unit and hospital stay especially in patients who have had previous open heart surgery.^[2] A beating heart procedure on CPB provides perfect myocardial protection.^[3] Normothermic CPB protects against hypothermia-related coagulopathy.^[1] Besides avoiding cross-clamping, it protects the myocardium against cardioplegia induced ischemia reperfusion injury.^[1] Trendelenburg position, continuous aortic venting, filling the cardiac chambers before the termination of CPB and trans-mitral or apical venting are useful to avoid air embolism.^[1,4] In the present case, the occluded right coronary artery was small in size. Therefore we did not want to injure the patent LITA graft so we preferred thoracotomy. Nevertheless the right coronary artery was found ungraftable on evaluation of this artery during the procedure. There may be aortic regurgitation of blood while retracting the left atrial wall during the procedure. This may be due to the disturbance of aortic valve coaptation on left atrial retraction. This regurgitant volume may disturb the surgical field. However as in our case if there the aortic valve has previously been replaced, this regurgitation will probably not be

a problem due to the fact that the coaptation of this mechanical valve will not occur. Another question which may arise is whether the small size of the valve prosthesis might have been due to the beating heart procedure or not. This is because the annulus constricts during systole and reaches a minimal area during mid systole (mean reduction 27%).^[5] So size measurement of the prosthesis may be complicated. However this problem may probably solved if the sizer is introduced during diastole. We also measured the size of the prosthesis during diastole so this probably minimally affected the size of the prosthesis. As a conclusion, on-pump beating heart normothermic mitral valve replacement without cross-clamping the aorta through right anterolateral thoracotomy is a simple and safe procedure.^[4] It offers a safe alternative to cardioplegic arrest in reoperations with low complication rates and lower perioperative mortality than with conventional surgery.^[6] It may be a good option for reoperation in patients especially those with patent bypass grafts.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Thompson MJ, Behranwala A, Campanella C, Walker WS, Cameron EW. Immediate and long-term results of mitral prosthetic replacement using a right thoracotomy beating heart technique. *Eur J Cardiothorac Surg* 2003;24:47-51.
2. Tribble CG, Killinger WA Jr, Harman PK, Crosby IK, Nolan SP, Kron IL. Anterolateral thoracotomy as an alternative to repeat median sternotomy for replacement of the mitral valve. *Ann Thorac Surg* 1987;43:380-2.
3. Holman WL, Goldberg SP, Early LJ, McGiffin DC, Kirklin JK, Cho DH, et al. Right thoracotomy for mitral reoperation: analysis of technique and outcome. *Ann Thorac Surg* 2000;70:1970-3.
4. Çiçekcioğlu F, Tütün U, Parlar AI, Aksöyek A, Babaroğlu S, Katircioğlu SF. Mitral valve replacement on a beating heart through right thoracotomy in a patient with patent coronary grafts. *Anadolu Kardiyol Derg* 2007;7:247-8.
5. Gorman RC, Gorman JH, Edmunds LH. Ischemic mitral regurgitation. In: Cohn LH, Edmunds LH, editors. *Cardiac surgery in the adults*. 2nd ed. New York: McGraw Hill; 2003. p. 751-70.
6. Cicekcioglu F, Tutun U, Babaroglu S, Mungan U, Parlar AI, Demirtas E, et al. Redo valve surgery with on-pump beating heart technique. *J Cardiovasc Surg (Torino)* 2007;48:513-8.