

Romatizmal Mitral Kapak Hastalıklarına Bağlı Gelişen Dev Sol Atriyumun Cerrahi Tedavisinde, Atriyal Plikasyon ve Duvar Rezeksiyonu Yöntemlerinin Kombine Edilmesi

COMBINATION OF ATRIAL PLICATION AND WALL RESECTION PROCEDURES FOR THE SURGICAL TREATMENT OF GIANT LEFT ATRIUM SECONDARY TO RHEUMATIC MITRAL VALVE DISEASE

Mehmet Adnan Celkan, Hakkı Kazaz, Haşim Üstünsoy, Celalettin Kayıran

Gaziantep Üniversitesi Tıp Fakültesi, Kalp Damar Cerrahisi Ana Bilim Dalı, Gaziantep

Özet

Amaç: Mitral kapak hastalıklarına bağlı gelişen dev sol atriyum, postoperatif hemodinamik ve respiratuvar birçok zararlı etkiler yapabilmektedir. Sol atriyum boyutlarını küçültmek için birçok cerrahi yöntem kullanılmıştır. Biz sol atriyum boyutlarında daha efektif bir küçültme sağlamak için bu cerrahi yöntemleri kombine ederek uyguladık. Bu çalışmamızda romatizmal mitral kapak hastalığına bağlı dev sol atriyumu olan dokuz hastada kullanılan cerrahi yöntemler tarif edilmiştir.

Materyal ve Metod: 2001 - 2003 yılları arasında dokuz hasta (3 erkek, 6 kadın, yaş aralığı 22-50) mitral kapak replasmanı ve sol atriyum küçültülmesi amacıyla ameliyat edildi. Dev sol atriyum küçültülmesi için üç cerrahi yöntem (1- Posterior paraannuler plikasyon 2- Posterior duvar plikasyonu 3- Duvar rezeksiyonu) kullanıldı ve sonuçları tartışıldı.

Bulgular: Erken mortalitemiz olmadı. Ekstübasyon sonrası periyod tüm hastalarda sorunsuzdu. Hiçbir hasta tekrar entübasyona ihtiyaç duymadı. Preoperatif ortalama sol atriyum çapı 7.92 ± 1.6 cm'den postoperatif 5.12 ± 0.95 cm'ye düştü. Sol ventrikül ejeksiyon fraksiyonu postoperatif birinci hafta da 54.22 ± 6.87 'den 55.44 ± 6.28 'e yükseldi.

Sonuç: Atriyum küçültme prosedürlerinin kombinasyonu postoperatif düşük debi sendromunu ve solunum yetmezliği insidansını önemli derecede düşürmektedir.

Anahtar kelimeler: Dev sol atriyum, mitral, atriyal plikasyon

Türk Göğüs Kalp Damar Cer Derg 2004;12:231-234

Summary

Background: Giant left atrium secondary to mitral valve disease produces postoperative hazardness in relation to hemodynamic and respiratory management. Many surgical procedures have been proposed to reduce the size of the left atrium. We have combined these surgical techniques and aimed to provide effective reduction in the left atrial size. In this report we describe the techniques used for the giant left atrium reduction in nine consecutive patients with rheumatic mitral valve disease.

Methods: Nine patients (3 men and 6 women aging between 22 and 50 years) were operated for mitral valve replacement and left atrial volume reduction between 2001 and 2003. We used three surgical techniques for the reduction of the giant left atrium (1- Posterior paraannular plication, 2- Posterior wall plication, 3- Wall resection), and outcome of patients were evaluated.

Results: There was no early mortality. Postextubation period was uneventful in all patient. No patient needed reintubation. Preoperative mean left atrial size (7.92 ± 1.6 cm.) was reduced to mean 5.12 ± 0.95 cm, postoperatively. Left ventricle ejection fraction rate improved from $54.22\% \pm 6.87\%$ to $55.44\% \pm 6.28\%$ in postoperative first week.

Conclusions: The combined atrial reduction procedures showed marked decrease in the incidence of low output syndrome and respiratory failure postoperatively. We conclude that plication and wall resection procedures are effective techniques for the treatment of compression in the presence of giant left atrium.

Keywords: Giant left atrium, mitral, atrial plication

Türk Göğüs Kalp Damar Cer Derg 2004;12:231-234

Introduction

Left atrial dilatation secondary mitral valve disease is not uncommon but giant left atrium is a rare condition. Left atrium is defined as 'giant' when it has a maximum diameter of > 6

cm on echocardiography [1]. The presence of a giant left atrium increases the incidence of thromboembolic complications in spite of anticoagulant therapy, decreases the cardiac output, and the compression of the adjacent organs can cause recurrent bronchopneumonia and dysphagia [2]. Postoperative mortality

Sunulduğu Kongre: Türk Kalp Damar Cerrahisi Derneği VII. Ulusal Kongresi, 23-27 Ekim 2002, Antalya

Adres: Dr. Mehmet Adnan Celkan, Gaziantep Üniversitesi Tıp Fakültesi, Kalp Damar Cerrahisi Ana Bilim Dalı, Gaziantep

e-mail: celkan@superonline.com

rate in mitral valve replacement with giant left atrium has been reported to be between 8%-32% [3].

Although many surgical procedures have been proposed to reduce the size of the left atrium, their effectiveness is not well established. But, only one surgical technique has been used in previous studies for the left atrial volume reduction. We have combined these surgical techniques and aimed to provide effective reduction in the left atrial size. In this report we describe our surgical techniques used for giant left atrium reduction in nine consecutive patients with rheumatic mitral valve disease and the outcome of patients.

Material and Methods

Between 2001 and 2003, nine patients were operated on for the mitral valve replacement and left atrial volume reduction. There were three men and six women aged between 22 and 50 years. Patients' characteristics are shown in Table 1. Valvular lesions were caused by rheumatic heart disease in all patient. The dyspnea was the major symptom in all patients. Patients were evaluated applying the cardiac telegram, transthoracic echocardiography and cardiac catheterization preoperatively. The control transthoracic echocardiography was performed on postoperative 7th day. Preoperative and postoperative left atrial sizes, left ventricle ejection fraction (LVEF), mean pulmonary artery pressure, left ventricular enddiastolic and endsystolic volumes and sizes were recorded (Table 2).

Surgical Technique

All operations were performed through a median sternotomy using cardiopulmonary bypass with moderate systemic hypothermia. Cardiopulmonary bypass was instituted using an arterial cannula in the ascending aorta and bicaval angled venous canulas in the right atrium. Myocardial protection was

achieved by multidose infusions of antegrade cold blood cardioplegia. Seven mitral valve replacement and two mitral and aortic valve replacements were performed using St. Jude Medical prostheses.

Three different surgical techniques were performed for reduction of the giant left atrium (Figure1): 1- Posterior paraannular plication (a), 2- Posterior wall plication (b), 3- Wall resection (c). In the posterior paraannular plication, starting from the upper corner of the left atrial appendix, posteroinferior atrial wall was plicated with 4-0 continuous polypropylene sutures so as to be the left atrial appendix stayed into suture line. The suture was passed the 1 cm away from the posterior mitral annulus and 2 cm from the pulmonary veins. In the second technique, atrial wall between the left and right pulmonary veins was plicated with 4-0 continuous polypropylene sutures. Posterior paraannular plication and posterior wall plication were used in all patients. Last technique, that was wall resection, was used in only four patients additional to above two techniques, who had the largest atrial size. In this group of patients, triangular segment of left atrium with the base on the posterior portion of the atriotomy and the apex towards the outlet of the pulmonary veins was removed. The incision in the left atrium wall was repaired with a continuous suture of prolene 4/0. The left atriotomy was repaired as usual, removing simultaneously a large strip of the reflection of the left atrium into the interatrial septum.

Results

The discontinuation of cardiopulmonary bypass was uneventful in all patients. Mean aortic cross-clamp and extracorporeal circulation times were 82.55 ± 10.45 and 105.67 ± 22.88 minutes, respectively. There was no early mortality in any

Table 1. Patients characteristics.

	Mean	No of patients (%)
Age (years)	36.22 ± 9.69	
Gender		
Male		3 (13.79%)
Female		6 (86.21%)
NYHA class	2.6 ± 0.7	
II		4 (55.17%)
III		4 (34.48%)
IV		1 (10.35%)
Atrial fibrillation		8
COPD		4
Cardiac Lesions		
MS		5
MS + TI		2
MS + AI		2
EF	54.22 ± 6.87	
Atrial Diameter	7.92 ± 1.6	

AI = aortic insufficiency; EF = ejection fraction; COPD = chronic obstructive pulmonary disease; MS = mitral stenosis; NYHA = New York Heart Association; TI = tricuspid insufficiency

Table 2. Echocardiographic measurements.

	Preop Atrial Size (cm)	Postop Atrial Size (cm)	Preop EF (%)	Postop EF (%)	LVEDD (cm)		LVESD (cm)	
					Preop	Postop	Preop	Postop
MVR	9.3	5.5	57	58	6.8	6.5	4.7	4.5
AVR + MVR	7	4	55	58	7.1	6.5	4.9	4.5
AVR + MVR	6.5	4	45	50	5.6	5.5	3.9	3.5
MVR	6.5	4.5	66	66	5.2	5	3.3	3.3
MVR	7	4.8	59	57	5.2	5.2	3.7	3.5
MVR	11	6.6	40	45	5.9	5.9	4.9	4.5
MVR, De-Vega Annuloplasty	7	5	57	60	5.6	5.4	3.9	3.7
MVR, De-Vega Annuloplasty	7.5	5.2	52	55	5.2	5	3.8	3.5
MVR	9.5	6.5	45	50	6	5.8	3.9	3.5

AVR = aortic valve replacement; EF = ejection fraction; LVEDD = left ventricle enddiastolik diameter; LVESD = left ventricle endsistolic diameter; MVR= mitral valve replacement

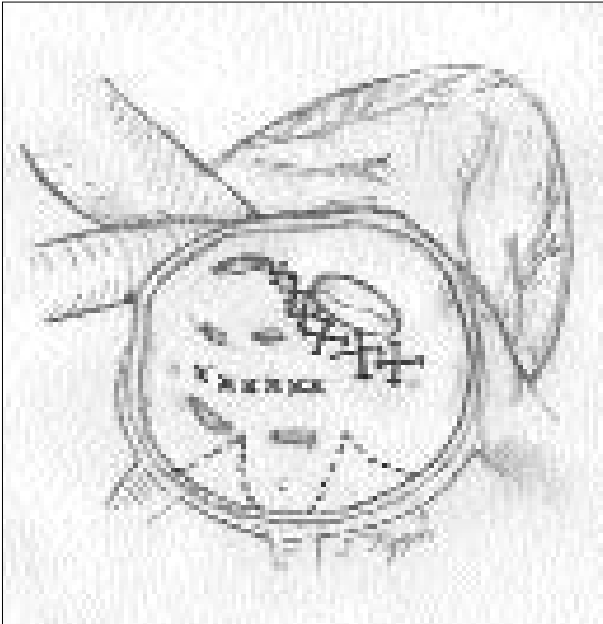


Figure 1. Surgical Techniques; a) Posterior paraannular plication, b) Posterior wall plication, c) Wall resection.

group. Five patients were extubated within postoperative sixth hour. Two patients were extubated at postoperative 12th hour. One patient, who had pulmonary problems preoperatively and NYHA class IV functional capacity, suffered from early respiratory problems and received respiratory support until postoperative second day and he was weaned from mechanic ventilation successfully. No patient needed reintubation. Postextubation period was uneventful in all patients. Preoperative and postoperative echocardiographic and hemodynamic measurements were shown in Table 2. Preoperative mean left atrial size was 7.92 ± 1.6 cm. It has been reduced to mean 5.12 ± 0.95 cm postoperatively. Left ventricle

ejection fractions rate improved from $54.22\% \pm 6.87\%$ to $55.44\% \pm 6.28\%$ in postoperative first week. Preoperative mean enddiastolic diameter reduced from 5.84 ± 0.65 cm to 5.64 ± 0.57 cm and endsistolic diameter reduced from 4.11 ± 0.57 cm to 3.83 ± 0.51 cm.

Mean follow up was 18 months. There was no late mortality. Only one patient was referred to emergency service for dyspnea and tachycardia on second postoperative month. Echocardiographic examination revealed pericardial effusion in this patient, and pericardiocentesis was performed without any problem. All patients were in NYHA class I/II, at the end of the first year of operation.

Discussion

Giant left atrium, associated with mitral valvular disease, frequently produces postoperative problems with regard to hemodynamic and respiratory management. Kawazoe and associates [4] have defined the most serious disorders induced by the presence of the giant left atrium in three categories as follows. First hemodynamic disturbance by the compression of the left ventricular wall by downward extension of the left atrium; second, respiratory disturbance yielded by the compression of the left main bronchus by upward extension of the left atrium; and third compression of the right middle lobe by rightward extension of the left atrium.

The plication procedure result in a significant decrease in the incidence of low-output syndrome and respiratory failure postoperatively, as well as a marked decrease in mortality, reported in previous studies [1,2]. Some controversial studies show mitral valve replacement that the giant left atrium is not a significant risk factor in MVR and does not affect early and late results as compared with patients without the giant left atrium, and atrial plication may not be required in absence of extra cardiac signs of compression [3].

In our study preoperative mean left atrial size reduced. The last value is less then 6 cm border. All patients' postoperative

respiratory weaning was uneventful. Isomura and associates [1] reported that the left atrial diameter measured by echocardiogram was a mean of 7.3 ± 1 cm. before operation and 5.8 ± 1 cm postoperatively. Hagihara and associates [5] concluded that performing left atrial plication during mitral valve surgery was safe and effective for patients with the giant left atrium. They found that the left atrial diameter decreased significantly from 69 ± 8.5 mm to 53.7 ± 9.1 mm shortly after surgery, and this decreased was maintained even 5 years of surgery. In this two study (only one surgical technique used) atrial sizes were reduced mean 20% and 23% respectively. However, in our study atrial size reduced mean 35%.

Matsuda and associates [6] investigated the causes of prolonged postoperative respiratory support in mitral valve disease with and without a giant left atrium. They found that there was no significant difference between the two groups concerning the duration of postoperative respiratory care and the frequency of reintubation.

For many years, a lot of surgical techniques to reduce the left atrial volume in the giant left atrium have been performed. Wall plication (technique 1 and 2) is the most preference technique. However, this technique alone, sometimes results in insufficient left atrial reduction. Recently some new techniques as triangular resection [7] and partial autotransplantation [8] have been used to reduce the left atrial volume. Triangular resection is the same technique of our wall resection technique. We performed the wall resection in patients with largest atrial volume. Partial autotransplantation was not performed. This approach is aggressive and could increase morbidity and mortality. Since the left atrial size was between 6 and 9 cm we performed para-annular and posterior wall plication. If left atrial size had been above 9 cm; we would have been preferred to perform wall resection and wall plication together.

Another important point in this study was, postoperative atrial fibrillation note of. Chronic atrial fibrillation is frequently associated with mitral valve disease, especially when the left atrium is enlarged, which is the main determinant factor in the appearance and maintenance of chronic atrial fibrillation [9]. Atrial fibrillation is rare in the left atrium with a diameter of less than 40 mm [10]. Reduced atrial volume, surgical sutures in the atrial wall and atrial resection may be important factors in low atrial fibrillation rate.

The techniques of left atrial reduction proposed here are safe surgical techniques that can easily be performed. Its may be implemented in every patient to have the giant left atrium and undergone mitral valve surgery. The combined atrial reduction

procedures showed marked decrease in the incidence of low output syndrome and respiratory failure postoperatively. We conclude that plication and wall resection procedures are effective method for the treatment of compression in the presence of giant left atrium secondary to rheumatic mitral valve disease.

References

1. Isomura T, Hisatomi K, Hirano A, Maruyama H, Kosuga K, Ohishi K. Left atrial plication and mitral valve replacement for giant left atrium accompanying mitral lesion. *J Card Surg* 1993;8:365-70.
2. Kawazoe K, Beppu S, Kakahora V, Nakojime N. Surgical treatment of giant left atrium combined with mitral valvular disease. *J Thorac Cardiovasc Surg* 1983;85:885-92.
3. Di Eusano G, Gregorini R, Mazzola A, et al. Giant left atrium and mitral valve replacement: Risk factor analysis. *Eur J Cardiothorac Surg* 1988;2:151-9.
4. Kawazoe K, Takahara Z, Tanaka K, et al. Giant left atrium in mitral valve disease: A new plication procedure to relieve the compressions of left ventricular wall left bronchus and right lung. *Nippon Geka Gakkai Zasshi* 1983;84:31-9.
5. Hagihara H, Kitamura S, Kawachi K, et al. Left atrial plication combined with mitral valve surgery in patients with a giant left atrium. *Surg Today* 1995;25:338-42.
6. Matsuda H, Nakao M, Nohara H, et al. The causes of prolonged postoperative respiratory care in mitral valve disease with a giant left atrium. *Kyobu Geka* 1990;43:172-7.
7. Sinatra R, Pulitani I, Antonazza A, Melina G. A novel technique for giant left atrium reduction. *Eur J Cardiothorac Surg* 2001;20:412-4.
8. Lessana A, Scorsin M, Scheuble C, Raffoul R, Rescigno G. Effective reduction of a giant left atrium by partial autotransplantation. *Ann Thorac Surg* 1999;67:1164-5.
9. Kawaguchi AT, Kosakai Y, Isobe F, et al. Surgical stratification of patients with atrial fibrillation secondary to organic lesions. *Eur J Cardiothorac Surg* 1996;10:983-90.
10. Winlaw DS, Farnsworth AE, Macdonald PS, Munday JA, Sprat PM. Left atrial reduction: The forgotten Batista. *Lancet* 1998;351:879-80.