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Early and mid-term results of irrigated radiofrequency left atrial ablation in chronic atrial fibrillation with concomitant mitral valvular pathology

Mitral kapak patolojisine bağlı kronik atriyal fibrilasyonda sol atriyal radyofrekans ablasyonun erken ve orta dönem sonuçları

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Background: Mid-term results of radiofrequency (RF) left atrial ablation in patients undergoing mitral valve surgery were evaluated in the present study.

Methods: Thirty two patients (12 males, 20 females; mean age 45.2±10.9 years; range 19 to 65) were operated for chronic atrial fibrillation in conjunction to mitral valve disease between May 2002 and February 2005. All patients had onset of chronic atrial fibrillation at least 1 year prior to surgical intervention. RF ablation and mitral valve surgery was performed to all of the patients.

Results: The recovery of sinus rhythm (SR) was 84.3% on the first postoperative day, 90.6% on discharge and 78.1% 6 months after the surgery.

Conclusion: The modified Maze III procedure with RF is safe and effective. Maintenance of the sinus rhythm is as high as the conventional surgical procedure.

Key words: Atrial fibrillation; catheter ablation; mitral valve.

Amaç: Mitral kapak cerrahisi uygulanan hastalarda sol atriyal radyofrekans (RF) ablasyonun orta dönem sonuçları incelendi.

Çalışma planı: Mayıs 2002 - Şubat 2005 tarihleri arasında, mitral kapak hastalığı ile birlikte olan atriyal fibrilasyon nedeniyle 32 hasta (12 erkek, 20 kadın; ort. yaş 45.2±10.9; dağılım 19-65) ameliyat edildi. Tüm hastaların cerrahi girişimden en az bir yıl önce başlayan atriyal fibrilasyonu vardı. Hastalara RF ablasyon ve mitral kapak cerrahisi uygulandı.

Bulgular: Sinüs ritmi görülme oranı ameliyat sonrası ilk gün %84.3 iken, taburculukta %90.6 ve altıncı ayda %78.1 idi.

Sonuç: Radyofrekans ile modifiye Maze III prosedürü güvenli ve etkili bir yöntemdir. Sinüs ritmine dönüş oranı konvansiyonel cerrahi prosedür kadar yüksektir.

Anahtar sözcükler: Atriyal fibrilasyon; kateter ablasyon; mitral kapak.

Atrial fibrillation (AF) is the most frequent cardiac arrhythmia which is observed in 0.4% of the general population.[1] It is observed in 1% of the population above 60 years of age.[2] About 40% of the patients undergoing mitral valve surgery have coexisting chronic atrial fibrillation before the operation, most of which is still persistent after the surgery.[3,4] The rate of the sinus rhythm after electrical cardioversion after mitral valve surgery is disappointing on long term follow-up.[5] In the recent years, several surgical techniques have been introduced for the treatment of atrial fibrillation. One of the most effective procedure for chronic AF is the maze procedure which is developed by Cox et al.[6,7] Several modifications of this procedure have been developed to simplify it such as making modifications in the atriotomies or using cryoablation.[8,9] Radiofrequency (RF) catheter ablation is another modification which became an important mode of treatment of AF.[5,10] The purpose of this study was to present the early and mid-term results of irrigated RF left atrial ablation for chronic AF concomitant with mitral valve surgery.

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PATIENTS AND METHODS

Patients. Thirty two patients (12 males, 20 females, mean age 45.2±10.9 years; range 19 to 65 years) with chronic AF underwent RF ablation of the left atrium in combination with mitral valvular surgery between May 2002 and February 2005. Mitral valvular surgery was indicated in all patients irrespective of AF. The chronic AF surgery inclusion criterion was AF lasting for more than 1 year which was assessed by using the patients' history and previous electrocardiograms. The decision for mitral valve surgery was taken according to the conventional clinical and hemodynamic criteria. The primary mitral pathology was mitral stenosis in 24 patients, mitral insufficiency in 3 patients and mitral stenosis plus insufficiency in 5 patients. The patients were preoperatively classified between class III-IV according to the New York Heart Association (NYHA) grading. No other cardiac valvular pathology was present in the patients. The mean left atrial dimension was 60.8±7.2 mm (range, 46 to 80 mm) as measured on an M-mode tracing taken from two-dimentional parasternal long axis view. The mean left ventricular end systolic diameter and left ventricular end diastolic diameters were 40.3±6.6 mm (range, 27 to 59 mm) and 55.6±6.7 mm (range, 41 to 70 mm) respectively. The mean left ventricular ejection fraction was 53.8±7.6% (range, 35- 65%).

The medications for ventricular rate control were continued until the day before the surgery. Oral anticoagulation therapy with warfarin sodium was used for prevention of the thromboembolic complications due to AF and was stopped 3 days before the surgery.

Surgical technique. The surgery for the mitral pathology and AF was done under standard cardiopulmonary bypass with standard aortic cannulation, bicaval cannulation, and moderate hypothermia. The heart was arrested with antegrade isothermic hyperkalemic blood cardioplegia after crossclamping of the aorta. Standard left atriotomy was done through the interatrial groove. The left atrial appendage was excised first. The amputation site was sutured after completion of the ablation procedure.

The left atrial ablation procedure was done before the mitral valve surgery. RF energy was used to create long continuous endocardial lesions with a cooled tip probe irrigated with saline solution. The Cardioblate (Medtronic Inc, MN, USA) unipolar RF ablation device was used for the ablation procedure. It consisted of a power generator and a pen. The electrode tip was irrigated with saline that cools the tissue and provides a low impedance path. A power output ranging from 20 to 30 watts / 5 cc irrigation / min was used for the ablation procedure. The right and the left pulmonary veins were isolated by encircling with the ablation catheter. These pulmonary vein islands were interconnected with an additional ablation line. An additional ablation line was performed from the left pulmonary vein island to the left atrial appendage amputation site. An ablation line was performed which connected the left pulmonary veins to the P2-P3 segment of the posterior mitral annulus. An ablation line from the middle of the line between the mitral annulus and the left pulmonary veins towards the base of the atria was performed to prevent re-entry pathways moving between the atria via the coronary sinus (Fig. 1). After the left atrial ablation procedure the mitral valve intervention was performed.

Postoperative Management. Antiarrhythmic prophylaxis with amiodarone was carried out on a routine basis. Intravenous bolus of 300 mg, followed by a continuous infusion of 1,200 mg/24 h until postoperative first day; and oral administration of 200 mg every 8 hours until discharge, followed by a maintenance regimen of 200 mg/d was administered to all of the patients. Amiodarone medication was continued for at least 6 months and was stopped in the presence of a stable sinus rhythm (SR). Holter, transthoracic ECG monitoring and transthoracic echocardiography were performed 6 months after the operation. Three months after surgery, oral anticoagulants were discontinued in patients who had stable SR and mitral repair.

Statistical Analysis. The SPSS 10.0 statistical software (SPSS Inc, Chicago, IL) was used for statistical analysis. Continuous variables were expressed as mean±1 standard deviation.

RESULTS

Twenty-two consecutive patients underwent left atrial ablation procedure in conjunction with mitral valve

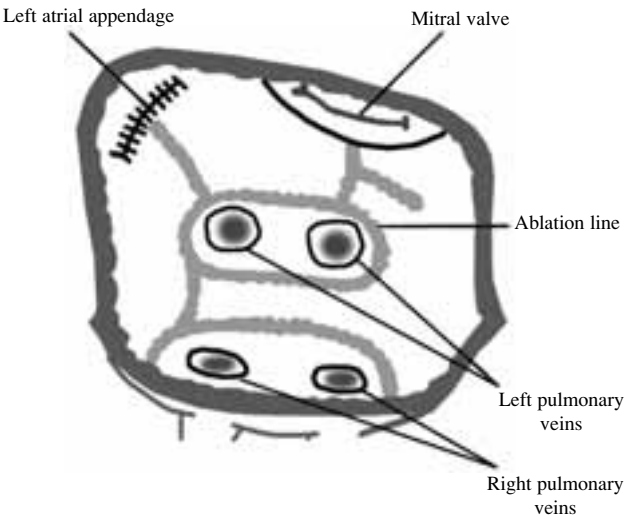

Fig. 1. The left atrial ablation procedure (View inside left atrium: Incision through the interatrial groove).

surgery. Mean ablation duration was 14.2±2.4 minutes (range, 11 to 20 minutes). There were no hospital mortality and late mortality. Seven patients underwent mitral repair and the other 25 patients had mitral valve replacement. Mean hospitalization time was 6.2±0.8 days (range, 5 to 8 days). Mean postoperative follow-up duration was 18.4±7.4 months (range, 6 to 36 months). The recovery of sinus rhythm (SR) was 84.3% in the first postoperative day which was 90.6% on discharge and 78.1% on the 6th month after the surgery. One patient had a junctional rhythm and one had AF which turned to SR in the fifth postoperative day. The rhythm of the other 3 patients who had AF after the operation remained AF through their hospitalization time.

The postoperative sixth month control revealed SR in 25 (78.1%) patients. The other 4 patients had AF with normal ventricular response and 3 patients had atrial flutter. None of the patients who were followed-up for more than 6 months had arrhythmia in their outpatient clinic controls. All had SR. The echocardiographic evaluation of the patients showed normal atrial function at the sixth month control.

DISCUSSION

The majority of patients undergoing mitral valve surgery have been reported to be in AF preoperatively, and 80% of these patients will remain in AF after surgical correction of the underlying cardiac disease.[3,4] For the majority of patients with intermittent AF or AF of duration less than 1 year, the mitral valve surgery alone is sufficient to restore sinus rhythm.[3,5]

Mohr et al.[10] and associates performed radiofrequency ablation of AF, the average duration was 7.8±5.2 years, in 234 patients with or without structural heart disease. At the 12 month follow-up, 69.7% of 43 patients with mitral valve surgery and 61.9% of the other patients with other surgical procedures were in sinus rhythm.

Sie et al.[11] and co-workers had used RF modified Maze procedure in their study, and found sinus or atrial rhythm in about 80% of the survivors who had had mitral valve related surgery and 67% in other types of cardiac surgery.

In the surgical Cox maze procedure, in patients with mitral valve diseases, the recovery of sinus rhythm was reported to be 63% of the 94 patients.[12] Kim et al.[13] and associates reported the surgical success rate of the Cox-Maze III procedure for AF associated with rheumatic mitral valve as 90.4% in their study population of 73 patients in a 12-56 month follow up period.

Akpinar et al.[14] had found favorable results in recovery of the SR in the patients they had operated for mitral valve disease with chronic AF. Combined procedure of port access mitral valve surgery and left atrial RF ablation had been found to be superior in maintenance of SR when compared to a valvular procedure alone. Six and twelve months freedom from AF had been found to be 87.2 and 93.6%, respectively in the combined procedure and 9.4% in the valve surgery alone. They concluded the short and intermediate term to be favorable in the combined procedure.

Guden et al.[15] reported that the saline-irrigated RF modified Maze procedure was successful in terms of restoring sinus rhythm. They found that biatrial RF ablation and left atrial RF ablation were not superior to one another statistically. For this reason, the left atrial ablation procedure is the preferred technique in our clinic.

The RF ablation seems to be very effective and almost a safe procedure which however prolongs the surgical procedure a little. Therefore, the ablation procedure may be a good choice in the treatment of AF in patients who are undergoing mitral valve surgery. The recovery of the SR is long lasting. Although, RF ablation increases the cost of the surgery, but it can be considered as cost effective in the long run when the cost of treatment of AF and its complications are taken into account.

In conclusion, RF ablation procedure should be taken into consideration for patients with chronic AF undergoing mitral valve surgery.

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