

Rheumatic valvular heart surgery and Maze III procedure

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Atrial fibrillation (AF) is a frequent complication in patients with mitral valve disease causing systemic embolism, cardiac chamber dilatation and decreased cardiac output.¹ Adequate treatment of mitral valve disease often does not relieve the cardiac rhythm disorder and AF persists or recurs.² Maze III procedure was proposed as a surgical treatment for patients with sustained AF. In this report, we describe our initial experience with the Maze III procedure in patients with rheumatic valve disease. From September 2000 to September 2002, 10 consecutive patients underwent the Cox-Maze III procedure concomitantly to mitral or other valve operation. All patients had an indication for cardiac surgery. Inclusion criteria for AF surgery was AF lasting for more than one year, medical history of previous thromboembolic events and large left atrium on preoperative transthoracic echocardiography. Exclusion criteria were non-cardiac disease, redo operation, severe left ventricular dysfunction and severe pulmonary artery hypertension. After establishing cardio-pulmonary bypass (CPB) and cross-clamping of the ascending aorta, the left atrium (LA) incision was carried out behind the interatrial septum and extended encircling around the pulmonary veins. The interatrial septotomy was made in the posterior to the orifice of the superior vena cava. In large sized LA, reduction size operation was carried out. The LA appendage was excised and incision made from its base to the encircling incision. This incision and remanent of LA appendage was closed. Extensive sutures were used to close the encircling incision. An incision was made from the LA to the middle portion of the posterior mitral valve annulus until coronary sinus was exposed. Fat tissues and remanent of muscle fibers around the coronary sinus and mitral valve annulus was cauterized and incision was closed. The mitral valve was excised and replaced with prosthesis or bioprosthesis valve according to patient's condition. After mitral valve replacement, the encircling incision was completely closed. In cases with aortic regurgitation, aortic valve replacement was carried out. After repairing ascending aorta, aortic clamp was removed and right side portion of the maze III procedure was performed. A long incision from the upper part of the right atrium to inferior vena cava is made and

extended T-incision from the inferior right atrial free wall to the tricuspid annulus. At this time, tricuspid valve repair was performed. After cauterization of fat tissue and muscle fibers around tricuspid annulus, the incision is partially closed. An incision from the right atrial appendage to the near tricuspid annulus in the free wall of right atrium was made and closed. Right atrial appendage was saved. All patients weaned off CPB with low dose inotrope. Standard 12 leads as well as right sided leads of electrocardiography (EKG) was checked daily during the postoperative hospital stay and first, third, sixth and twelfth months postoperatively. After operation, sinus rhythm on EKG was defined when the P-wave was present. In early postoperation, to evaluate cardiac function and the recovery of atrial function, transthoracic echocardiography was performed and a peak A-wave velocity was considered evidence of effective atrial contraction.

There were 2 men and 8 women with a mean age of 40 ± 8 years. All patients had rheumatic mitral stenosis or regurgitation. Severe aortic regurgitation in 2 patients and tricuspid regurgitation in 4 patients were found. **Table 1** shows the demographic data of patients before operation. **Table 2** shows the operative variables and concomitant cardiac procedures. In early postoperative period, 2 patients required re-operation due to suture line bleeding. Normal sinus rhythm was restored in 6 patients and atrial contractility was demonstrated in 5 patients. There was no occurrence of low cardiac output syndrome, thromboembolic events, stroke or need for permanent pacemaker implantation. All patients were followed up for 470 ± 230 days. Six months postoperation, normal sinus rhythm was found in 8 patients and LA contractility in 7 patients. In all patients, in early or late period of postoperation, supra ventricular tachycardia or thromboembolic events do not occur.

All of the patients undergoing the maze in our series were referred specifically for correction of rheumatic valvular pathology rather than correction of symptomatic AF. The New York Heart Association class in patients with rheumatic disease was higher than in patients with other diseases and the technique of operation is distinct from isolated AF, with regard to mitral valve and multiple valve procedures. The combined valve procedure required significantly longer aortic clamping time than the isolated maze procedure. It has been shown that some patients would restore sinus rhythm with only the mitral valve procedure.³ Association of maze in those patients may have additional

Table 1 - Patient's characteristics (N=10).

Variable	N
Male/Female	2/8
Age (years)	40±8
NYHA	
Class 2	1
Class 3	9
LAD (mm)	68±15
PAP (mmHg)	
Systolic	55
Diastolic	19
LVEF (%)	50±7
Mitral stenosis	8
Mitral regurgitation	1
Mixed lesion	6
Aortic valve disease	2
Tricuspid valve disease	4
History of embolic event	2
AF duration (year)	> 1
Data expressed as mean ± SD NYHA - New York Heart Association, LAD - left atrial dimension, PAP - pulmonary artery pressure, LVEF - left ventricular ejection fraction, AF - atrial fibrillation	

Table 2 - Operative variables and concomitant cardiac procedure in 10 patients.

Variable	N
CPB time (min)	144±18
AXC time (min)	90±11
Prosthesis	
Mechanical	10
Biological	2
MVR	8
MVR + AVR	2
TAP	3
TVR	1
Need to permanent pace maker (n)	0
Data expressed as mean ± SD CPB - cardio-pulmonary bypass, AXC - aortic cross clamp, MVR - mitral valve replacement, AVR - aortic valve replacement, TAP - tricuspid annuloplasty, TVR - tricuspid valve ring	

morbidity with no benefit. For this reason, it is necessary to carefully identify those patients who need maze procedure preoperatively.

Interruption of macroreentrant circuits responsible for AF requires performance of several incisions in both atriums. Given this complexity of the technique, bleeding from less accessible suture line has been a significant consideration.⁴ In our early experience, 2 patients had bleeding from suture lines.

In some of our cases, LA diameter was more than 75 mm. In these patients, we excised portions of the inferior and dome of the left atrium to reduce the left atrial size. In others, extensive suturing of the LA during the maze procedure lead to significantly decrease in LA dimension. In all patients we were faced with a relatively thin and fibrotic atrial wall. We suppose lower success rate of recovering atrial rhythm and contractility in our series have direct relation to the replacement of fibrosis in atrial wall due to LA dilatation and rheumatic pathology. It has been reported that LA function and sinus rhythm are gradually recovered after the maze procedure.⁵ In the present study, both the electrical and mechanical atrial activities were recovered in the first 6 months and maintained for 2 years after operation. It seems reduction of atrial size, volume load and inflammation lead to the gradual recovery of electrical and mechanical atrial activities.

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