Case Report

Right Atrial Separation Effect for Chronic Atrial Fibrillation with Atrial Septal Defect: Report of Four Cases

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We operated on 56 adults diagnosed with atrial septal defect (ASD) between 1990 and 2004. Of these, eight had complications of atrial fibrillation (AF) in the preoperative period. After 1998, right atrial separation was performed in four cases. Marked improvement was noted in three out of the four cases. The right atrial separation procedure was a simple, easy, and effective method for the treatment of chronic AF associated with ASD. (Ann Thorac Cardiovasc Surg 2006; 12: 210–2)

Key words: adult, right atrial separation, atrial septal defect, atrial fibrillation

Introduction

Chronic atrial fibrillation (AF) is a type of arrhythmia often associated with atrial septal defect (ASD) in adults, and its incidence frequency increases with age.[1)] We devised a simple procedure for ablating the chronic AF associated with ASD. Here, we describe four patients with ASD and chronic AF. Three out of the four were cured by this procedure; however, one of them had a recurrence.

Cases

We treated 56 adult patients (aged over 20 years, mean age 58.5 years) in whom ASD was diagnosed between 1990 and 2004. Eight patients (14.3%; mean age 60.9 years) had developed complications of AF. From 1998 to 2004, we performed right atrial separation for four patients who had ASD and chronic AF. Their respective ages were 55 years (case 1), 73 years (case 2), 53 years (case 3), and 67 years (case 4). Case 1 had persistent AF for one year and case 2, for seven years; however, cases 3 and 4 had it for indistinct periods of time. Additionally, case 4 was that of paroxysmal atrial fibrillation (PAF). All the patients presented with symptoms of heart failure on admission to our hospital for medical treatment, and were diagnosed with AF. Their preoperative status is shown in Table 1. Slight pulmonary hypertension was detected in case 1, however, this was absent in the other cases. All the patients also had findings indicative of right atrial dilation and tricuspid valve regurgitation (TR). The serum chemistry analysis was normal. Surgery via a median sternotomy was followed by a cardiopulmonary bypass that was performed by cannulating both the venae cavae and the aorta. Subsequently, the aorta was clamped and blood cardioplegia was infused for myocardial protection. Thereafter, the right atrial separation procedure was performed. A vertical incision was made 3 cm lateral and parallel to the sulcus terminalis and was then curved away from the tricuspid annulus, the upper incision curving upward by 3 cm and the lower incision, downward by 1 cm. A horizontal incision was subsequently added at the lower part of the sulcus terminalis toward the atrial septum. Care was taken to ensure that the sinoatrial node and its artery were protected from injury. In order to complete the procedure, cryoablation (Fig. 1, black line) at −60˚C for 2 min was then delivered to the atrial septum between the sulcus terminalis and the defect. Addition-

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Table 1. Characteristics of the patients preoperative status

Case	1	2	3	4
Age (yr)	55	73	53	67
Sex	Female	Male	Female	Female
AF history (yr)	1	7	Unknown	Unknown
CTR (%)	65.0	58.0	77.0	54.0
L-R shunt (%)	66.0	72.6	81.6	45.6
Qp/Qs	2.9	3.44	4.97	1.81
ASD size (mm)	35×25	40×20	40×40	22×14
PAP (mmHg:s/d(m))	41/18(30)	32/4(16)	25/10(24)	31/13(19)
TR degree	III	III	III	II

Characteristics of the patients in whom the right atrial separation procedure was performed.
yr, year; AF, atrial fibrillation; CTR, cardiothoracic ratio; L-R, left to right; Qp/Qs, ratio of plumonary to systemic blood flow; ASD, atrial septal defect; PAP, pulmonary artery pressure; TR, tricuspid valve regurgitation.

ally, it was also delivered to the atrial tissues between the upper incision margin and the tricuspid annulus (Fig. 1).[2] Subsequently, the right atrium was divided into three electrically connected parts. The free right atrial wall comprised the first part, while the upper and lower parts of the atrial septum formed the second and third parts, respectively. The atrial septal defect was then closed through a right atriotomy, and the DeVega procedure was performed to repair the tricuspid valve regurgitation. The right atriotomy was closed by evacuating air through the aortic root by releasing the aortic cross-clamp.

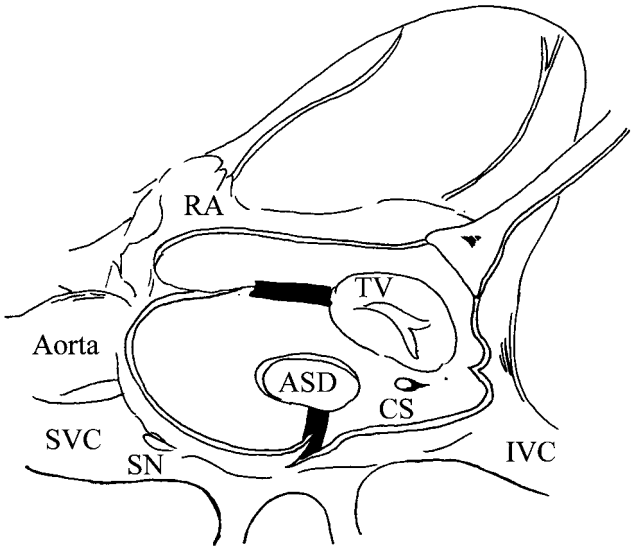

Fig. 1. Schema of the right atrial separation procedure. Sinus nodal arteries were protected from surgical incisions and cryolesions. ASD, atrial septal defect; CS, coronary sinus; IVC, inferior vena cava; RA, right atrium; SN, sinus node; SVC, superior vena cava; TV, tricuspid valve.

Results

Cases 1 and 3 converted to sinus rhythm postoperatively. Case 2 developed AF again on the ninth postoperative day. With regard to case 4, the frequency of PAF reduced. Two years having passed, cases 1 and 3 continue to have sinus rhythm.

Discussion

AF is a type of arrhythmia often associated with ASD in adults. An increase in atrial pressure and a volume overload have been known to cause AF. Sealy et al. reported[3] that an increase in right atrial pressure and a volume overload for a long time causes hyperplasia and fibrosis of the sinoatrial node. Therefore, maze procedure is useful for the right atrium. In fact, there is a report that to date, the maze procedure yields good consequences in the case of chronic AF associated with ASD.[4] Sueda et al.[2] improved on the maze surgery for the right atrium. Maze procedure is based on the Lin's procedure,[5] and it is superior to the use of an electric circuit around ASD. We treated 56 adult patients in whom ASD was diagnosed between 1990 and 2004. Eight patients had developed complications of AF. From 1998 to 2004, we performed right atrial separation for four patients who had ASD and chronic AF. Enlargement of the left atrium and mitral valve abnormalities were not detected in any case. Since the left atrial and ventricular functions were not particularly abnormal, right atrial pressure overload, volume overload,

and TR were the causes of AF. There was marked improvement in three patients. Unfortunately, one patient who had a long history of AF, had a recurrence. Kobayashi et al. reported[6] that left atrial enlargement may be a cause of AF rather than a result of it. Although enlargement of the left atrium was not detected, we believed that the degeneration of the atrium extended to both atria if AF persisted for a long time. On the other hand, prior to 1997, four patients with chronic AF associated with ASD were under medication; however, the AF did not disappear postoperatively. Medication was the main line of treatment for AF; however, the right atrial separation procedure was a simple, easy, and effective method for the treatment of chronic AF associated with ASD.

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