

## Incidence of Atrial Fibrillation after Open Heart Surgery

Mohammad Sina, MD; Mohammad Hasan Kalantar Motamedi, MD\*;  
Akbar Akbarzadeh, MD; Mostafa Mahdavian, RN

### Abstract

**Background-** Atrial fibrillation (AF) is a common complication of heart surgery. This unwanted sequel leads to an increased risk of thromboembolism and necessitates further often costly health care. Advanced age, previous AF rhythm, and valvular heart disease are the most consistently identified risk factors for the development of this rhythm after cardiac surgical procedures. Dispersion of repolarization leading to reentry is believed to be the mechanism of postoperative AF. Treatment is aimed at controlling heart rate, preventing thromboembolic events, and converting to sinus rhythm.

**Material-** 500 consecutive patients who were undergoing cardiac surgical procedures consisting of coronary artery bypass, valve procedures and combined coronary-valve procedures were prospectively evaluated to determine the predisposing factors relating to the development of postoperative AF rhythm.

**Results-** In this series of 500 patients undergoing cardiac operations at our center, we found the incidence of AF to be 13% after coronary artery bypass grafting (CABG), 24% after mitral valve replacement, 23% after aortic valve replacement, and 32% after combined CABG and valve replacement procedures. Patient age, valvular heart disease, preoperative AF rhythm, and discontinuation of beta-blockers were shown to be statistically significant in determining the development of postoperative AF rhythm in our group of patients.

**Conclusion-** The only firm conclusion that can be drawn concerning preventive measures is that beta-blocker withdrawal is to be avoided after heart operations and to consider beta-blocker therapy for other patients who may tolerate these drugs in order to reduce the chances of developing AF rhythm. (*Iranian Heart Journal*. 2002; 2(4)&3(1): 58-60)

**Key words:** Atrial fibrillation ■ Cardiac surgery ■ Beta-blockers ■ Complication

Atrial fibrillation is a common complication after open heart surgery and an important source of patient morbidity. The incidence of this arrhythmia varies from center to center depending on the method and duration of arrhythmia monitoring and also from patient to patient (patient characteristics, type of operation, and presence of symptoms).

Postoperative AF is usually well tolerated but tachycardia and loss of organized atrial contraction may result in hypotension and congestive heart failure in some patients. Even when hemodynamically tolerated, postoperative AF has unfavorable consequences. The risk for postoperative stroke has been shown to be nearly three-fold higher for patients with postoperative

From the Department of Cardiac Surgery, Shaheed Rajaie Cardiovascular Medical Center, Iran University of Medical Sciences, Tehran, and the \*Department of Cardiovascular Surgery, Baqiatallah University of Medical Sciences, Tehran, Iran.

Correspondence to: M. Sina, MD, Dept. of Cardiac Surgery, Shaheed Rajaie Cardiovascular Medical Center, Vali-Asr Ave, Mellat Park, Tehran, Iran.

Email: [sina@rhc.ac.ir](mailto:sina@rhc.ac.ir)

Fax: +(9821) 2042026

AF, especially for those with low cardiac output.<sup>1,2</sup> Patients developing postoperative AF are hospitalized an average of 3.3 days longer than patients who remain in sinus rhythm, which leads to increased hospital morbidity and hospital cost.<sup>3</sup>

### Patients and Methods

In this prospective study, we began the collection of data for 500 consecutive patients who underwent open heart surgery to clarify the relationship between postoperative AF rhythm and preoperative and postoperative parameters. In this series of 500 patients undergoing cardiac operations at our center, we found the incidence of AF to be 13% after coronary artery bypass grafting (CABG), 24% after mitral valve replacement, 23% after aortic valve replacement, and 32% after combined CABG and valve replacement procedures.

Other researchers have reported atrial arrhythmias in 27% to 33% of patients after CABG.<sup>2,3</sup>

As is clear in the data presented in Table I, the patients' age has consistently been demonstrated to be the most important risk factor for postoperative AF, with incidence rates of 12% in patients who were under 50 years of age, but 26% of AF patients were over 60 years old (Table I).

**Table I. Patient data**

Age	< 50	50 - 60	> 60
500	210 (42%)	150 (30%)	140 (28%)
AF	12%	19%	26%

AF indicates atrial fibrillation

Other risk factors that were identified included valvular heart disease. The incidence of AF in coronary artery disease was 13%, but in valvular heart disease this figure rose to 25% (Table II).

**Table II. Incidence of AF in valve and coronary bypass patients**

Rhythm	CABG	Valve replacement	Total
Sinus	363	137	500
AF	13%	25%	38%

CABG indicates coronary artery bypass graft surgery; AF, atrial fibrillation

Furthermore, there was a correlation between postoperative AF and preoperative AF; more than 61% of AF patients had a history of AF rhythm preoperatively for a period of time and had been treated medically. The withdrawal of beta-blockers after surgery was also another risk factor for the development of AF rhythm in our study.

### Results

As we can see from the data in Table I, patients' age has consistently been demonstrated to be the most important risk factor for postoperative AF, with incidence rates of more than 26% for patients older than 60 years who undergo open heart surgery, compared with 12% for patients less than 50 years.<sup>1,3</sup> This association has been explained to be attributable to age-related structural changes in the atrium such as dilation, muscle atrophy, decreased conduction tissue, and fibrosis.<sup>11,12</sup>

The next risk factor was valvular heart disease. The incidence of AF rhythm in valvular heart disease and CABG was 25% and 13%, respectively. The history of rheumatic heart disease and dilation and hypertrophy of atrium are contributing factors.

A history of AF rhythm before surgery and drug treatment for AF are also risk factors for postoperative AF rhythm, due to contributing factors like left ventricular hypertrophy, hypertension, obstructive lung disease, and withdrawal of medicine.

## Discussion

It is widely believed that enhanced sympathetic nervous system activity increases susceptibility to postoperative AF.<sup>4</sup> Sympathetic activation, however, is highest during the first 24 hours after surgery, whereas the onset of AF usually occurs between the second and third postoperative days.<sup>1,3</sup> The reason for the delay in the onset of AF more than 2 to 3 days after surgery is not clear. One possibility is that the onset of AF is related to an exaggerated inflammatory response, especially involving the pericardium.<sup>6,8</sup>

Nonetheless, although AF is the most frequent complication after open heart surgery, certainly it alone is not the most expensive complication. Nevertheless, the cumulative cost of AF will exceed that of any other complication.

Mural thrombus formation is the most serious complication of AF. In an autopsy series involving non-surgical patients, 21% of patients with a history of AF had atrial thrombi compared with 2% of control patients.<sup>10</sup> Atrial thrombi were found in 30% of patients with valvular heart disease-related AF compared with 14% of patients with non-valvular related AF. In this series thrombi were more than three times as likely to occur in the left as compared to the right atrium.

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