

Is Cardiopulmonary Bypass Really the Cause of Postoperative Atrial Fibrillation?

To the Editor:

The occurrence of atrial fibrillation (AF) after coronary bypass graft surgery is elevated and is the cause of perioperative complications as well as increased costs. Recently, we have demonstrated¹ that the occurrence of AF is not confined to the postoperative period and that 6 months after surgery, AF is still present in 39% of the patients who develop postoperative supraventricular arrhythmias.

It has been reported that ischemic injury of the atrium promotes AF, although the underlying mechanism remains unclear. In the September 26, 2000, issue of *Circulation*, Ascione and co-workers² reported that the incidence of AF after coronary revascularization was significantly decreased, from 45% in patients operated on under cardiopulmonary bypass (CPB) to only 11% in those operated on without CPB (ie, "off-pump"). From this they concluded that CPB is the main independent predictor of postoperative AF. In their study, 2 variables, namely CPB and myocardial protection, were investigated in 2 groups of patients. It may easily be deduced from the study design that it would be impossible to separate the effect of CPB from that of myocardial protection. The authors clouded the issue by stating that "CPB inclusive of cardioplegia arrest is the main predictor of postoperative AF" and used this argument to support the use of off-pump surgery for coronary revascularization.

In our study,¹ we observed a significant reduction in postoperative AF, from 28% in hearts protected with cardioplegia to 9% in those operated on using short periods of ischemia (ie, intermittent ischemia). Both groups of patients were operated on under CPB, and the only variable was the type of myocardial protection, which supports the thesis that the incidence of AF may not be related to CPB but to the myocardial injury sustained during the period of ischemia. Therefore, on the basis of the present evidence, the use of CPB during coronary revascularization cannot be regarded as a cause of postoperative AF.

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1. Loubani M, Hickey MS, Spyt TJ, et al. Residual atrial fibrillation and clinical consequences following postoperative supraventricular arrhythmias. *Int J Cardiol.* 2000;74:125-132.
2. Ascione R, Caputo MD, Calori G, et al. Predictors of atrial fibrillation after conventional and beating heart coronary surgery: a prospective, randomized study. *Circulation.* 2000;102:1530-1535.

Response

We read with interest the comments of Galiñanes and Loubani, and we agree with them that on the basis of our study, it is not possible to separate the effects of cardiopulmonary bypass (CPB) from those of cardioplegic arrest as independent predictors of postoperative atrial fibrillation (AF) in patients undergoing coronary artery bypass graft (CABG) surgery. Our observation resulted from a prospective, randomized study¹ comparing off-pump coronary surgery with conventional CABG using normothermic CPB, inclusive of cardioplegic arrest with intermittent antegrade warm-blood cardioplegia.

Loubani and colleagues² have recently demonstrated that AF after CABG surgery, which may persist for as long as 6 months, is influenced by the type of myocardial protection used. Their study, although accurate and well conducted, had an important limitation in the retrospective, nonrandomized nature of the investigation. A total of 3 groups with different types of myocardial protection were studied (not 2 groups, as stated in their letter), and although the patients were all operated on under CPB, there was a further variable: the systemic body temperature. The body was cooled to 28°C in the crystalloid cardioplegia group, maintained at normothermia in the warm-blood cardioplegia group, and cooled to 32°C in the intermittent-ischemia group. It is possible that the body temperature during CPB might have affected the results. Systemic cooling during CPB is a known risk factor in the development of AF after CABG surgery.³ The conclusion that the incidence of AF is not related to CPB but to the type of myocardial protection seems to us unproven because in the study by Loubani et al,² it is impossible to separate the effect of myocardial protection from that of the systemic body temperature during CPB.

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1. Ascione R, Caputo M, Calori G, et al. Predictors of atrial fibrillation after conventional and beating heart coronary surgery: a prospective, randomized study. *Circulation.* 2000;102:1530-1535.
2. Loubani M, Hickey MS, Spyt TJ, et al. Residual atrial fibrillation and clinical consequences following postoperative supraventricular arrhythmias. *Int J Cardiol.* 2000;74:125-132.
3. Adams DC, Heyer EJ, Simon AE, et al. Incidence of atrial fibrillation after mild or moderate hypothermic cardiopulmonary bypass. *Crit Care Med.* 2000;28:309-311.