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Discussions

Dr. Fred Crawford (Mt. Pleasant, South Carolina): I would like to commend Dr. Lowe and his coauthors for this attempt to clarify a topic that has been discussed at some length over the years without definite conclusions being reached.

As the authors indicate, atrial fibrillation commonly occurs after cardiac surgical procedures. While it is a nuisance and without serious consequences in many patients, it can produce morbidity and, as the authors indicate, may prolong the stay in the intensive care unit and in the hospital.

Because of the frequent occurrence of this problem, many authors have tried to address it with either retrospective or prospective studies. In fact there are available in the literature both prospective and sometimes randomized studies to support virtually any position one would like to take insofar as the administration of various drugs before and after operation to prevent atrial fibrillation.

Certainly all of our patients would be well served if a simple test such as that described by the authors were available that would prospectively select out those at higher risk for the development of AF after operation so that they might be appropriately medicated, and at the same time allow the avoidance of medication for those at low risk.

The study by Lowe and colleagues attempts to do this. I have several questions of the authors.

First how did you decide on an upper limit of 200 microamps for your atrial stimulation?

Have you looked at your data to see if stimulation at a lower level would weed out many of the false positives, thus producing a higher predictive value?

If the tests were consistently successful in predicting a group at higher risk for atrial fibrillation, what would be your current drug of choice for prophylaxis against this development?

And, finally, have you applied the test prospectively and combined it with your drug of choice to see if the postoperative incidence of atrial fibrillation in your patients can be decreased?

Dr. John Hammon (Nashville, Tennessee): I congratulate Dr. Lowe and his colleagues on a study that attempts to solve a very vexing problem for cardiac surgeons. That is the routine coronary patient who seems to be doing well, develops atrial fibrillation, and then develops a stroke or a low-cardiac-output peripheral embolism. This is truly a serious problem in our experience and the experience of others. I think Dr. Lowe's identification of these patients brings forward a new way of looking at this problem, which, in our experience is very valuable.

We performed a study several years ago in which we randomized a group of patients to receive propranolol after the operation immediately on arrival to the intensive care unit for the control of atrial and ventricular arrhythmias and found that this drug was very valuable in doing this. However in many of our patients who were older or sicker with bad ventricles, the propranolol dosage could not be adjusted to levels where prophylaxis could be induced. And therefore if we could identify a higher-risk group of patients, perhaps, better drug regimens could be recommended for this group of patients.

I have one question regarding the study. I think in our own experience in inducing ventricular fibrillation and measuring fibrillation and defibrillation thresholds in the operating room, we found that during the time of induction of anesthesia, during the time of cannulation for cardiopulmonary bypass, and immediately after cardiopulmonary bypass, these thresholds can be altered, perhaps by increased levels of plasma epinephrine, and norepinephrine, which have been measured in our laboratories. I was wondering if Dr. Lowe would comment on this feature.

Also I wonder if the large group of patients who were positive in his study might have been influenced by the rather heterogeneous group of patients he studied, rather than taking a group of patients purely with coronary disease.

Dr. James E. Lowe (Closing discussion): Dr. Crawford we chose 200 microamps in this initial protocol as the upper limit of stimulation because of the tremendous safety margin required with the use of alternating current. As you implied, patients who developed intraoperative atrial fibrillation at lower stimulating currents were indeed more likely to develop postoperative atrial fibrillation. In other words, those who went into AF in the operating room, either sustained or nonsustained, at 75 to 100 microamps had a 70% incidence of postoperative AF. However, if we did not include those patients who were stimulated up to 200 microamps, we would have missed a number of patients who developed

postoperative AF and therefore had some false-negative intraoperative studies. The crux of the matter is that if you stimulate with too high a level of alternating current, you will increase the number of people who are placed in the at risk group. However if you don't stimulate with high enough amounts of alternating current, you will have a false sense of security in the negative group.

Obviously we will learn more in the future by applying this protocol to large numbers of patients. We do plan a prospective study that will allow us to direct prophylactic therapy after operation to all patients who had inducible AF during operation. We hope that we might be able to reduce the incidence of postoperative AF in our unit from 36% to 5% to 10%. We believe that applying prophylactic therapy to those patients at risk for atrial fibrillation will significantly reduce total hospital costs and eliminate the morbidity resulting from perioperative AF. As for the drug of choice, we are still undecided. We probably will use intravenous procainamide administered just before discontinuation of cardiopulmonary bypass with subsequent postoperative digitalization in those patients who have no ventricular arrhythmias.

Dr. Hammon suggested that there are variations at different points in time in AF thresholds. I believe that he is exactly right. The threshold may depend on circulating catecholamines and the amount of irritation to the atria at the time of cannulation.