

## Q: Is postoperative atrial fibrillation in patients undergoing noncardiothoracic surgery an important problem?

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**A:** Although the data on postoperative atrial fibrillation (AF) in patients undergoing noncardiothoracic surgery are sparse and largely observational, postoperative AF appears to have significant clinical and financial ramifications.

### Burden is significant

The incidence of postoperative supraventricular arrhythmia (SVA), including atrial fibrillation (AF), appears highly variable and dependent on the population under study. The burden of this problem is considerable, however. Postoperative atrial arrhythmias affect about 1 million elderly Americans annually.<sup>1</sup> These events are associated with significantly longer hospital stays, increased morbidity, and inflated health care costs.

Despite a lower incidence, the overall burden of postoperative atrial tachyarrhythmias is higher with noncardiac surgery compared with cardiac surgery, due to larger volumes.

### Findings from largest prospective study

The largest and most rigorously conducted prospective study on the incidence of all atrial arrhythmias in major, nonemergent, noncardiac surgery evaluated 4,181 patients aged 50 years or older who were in sinus rhythm preoperatively. This study included some patients undergoing thoracic surgery, which is associated with significantly higher rates of postoperative SVA than is noncardiothoracic surgery.<sup>2</sup> Serial electrocardiograms were obtained, preoperative clinical data were collected, and postoperative cardiac enzyme levels and clinical outcomes were measured.

Postoperative SVA occurred in 317 patients (7.6%). The incidence of AF was 3.7% in the postoperative period and 4.1% in the intraoperative and postoperative periods combined. SVA was associated with a 33% increase in the length of hospital stay.

Of the nonmodifiable factors identified preoperatively, male sex, age 70 years or older, significant valvular heart disease, history of SVA, asthma, con-

gestive heart failure (CHF), premature atrial complexes on electrocardiography, American Stroke Association class III or IV, and type of procedure were independent predictors of new SVAs in the postoperative period. Of the surgical procedures, abdominal aortic aneurysm repair and abdominal, vascular, and intrathoracic procedures were particularly associated with an elevated risk of postoperative SVA.

Postoperative cardiac complications such as CHF, cardiac ischemia, myocardial infarction, ventricular tachycardia, cardiac arrest, and postoperative hypotension, as well as noncardiac events such as pneumonia, bacteremia, infection, urinary tract infection, stroke, pulmonary embolism, and gastrointestinal bleeding, were independently correlated with development of SVA. This study also suggested that the use of beta-blockers and calcium channel blockers appeared to have no effect on the development of SVA postoperatively.

### Additional studies

In a prospective study of 462 patients in the intensive care unit (ICU) after noncardiothoracic surgery, the incidence of new-onset atrial arrhythmias was 10.2%.<sup>3</sup> Most arrhythmic events occurred in the first 2 days, and patients with arrhythmic events had a higher mortality rate, a longer ICU stay, and a longer hospital stay than those without arrhythmic events, although most deaths were the result of sepsis and cancer and not the rhythm disturbance per se.

One of the earliest studies on postoperative AF was conducted in patients undergoing cancer surgery.<sup>4</sup> AF appeared to be precipitated by sepsis, pneumonia, CHF, cardiac ischemia, pulmonary embolism, and hypokalemia. Advanced age and male sex were key risk factors, a finding that has been confirmed in subsequent studies. In this study, which appears to have major limitations (including a small sample size and being limited to a surgical ICU setting), AF did not have major clinical sequelae.

In a prospective study from the United Kingdom that included 226 patients undergoing colorectal surgery, 29 (13%) had significant arrhythmias on electrocardiographic monitoring,<sup>5</sup> with AF being the most common arrhythmia. Electrolyte disturbances were often present, and patients frequently required rapid administration of antiarrhythmic agents.

In another prospective study from the United

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Kingdom, this one of 51 patients undergoing colorectal surgery, 13 (26%) developed a postoperative arrhythmia, most often AF.<sup>6</sup> Significant univariate correlates of AF in this study were age, hypertension, preoperative and postoperative potassium levels, and postoperative pulmonary edema. Thirty-one percent of all patients who developed the arrhythmia had sepsis, compared with 18% of controls ( $P = .38$ ).

A retrospective study of 13,696 patients undergoing noncardiothoracic surgery over 2 years revealed an AF incidence of 0.37% (51 patients).<sup>7</sup> Most of those affected had cardiac risk factors at the time of surgery, a positive fluid balance, or electrolyte or arterial oxygen saturation abnormalities.

#### Bottom line on incidence and clinical predictors

The incidence of postoperative AF/SVA in patients undergoing major noncardiothoracic surgery is difficult to estimate but varies from approximately 0.37% to 26%, depending on the population studied and the rigor of postoperative monitoring. Advanced age, electrolyte imbalances, infection and sepsis, CHF, pulmonary embolism, and hypotension appear to predict the development of this arrhythmia quite consistently.

#### Effect on mortality unknown

The effect of AF/SVA on mortality is debatable. Most studies indicate that it appears to prolong the length of hospital stay and also contributes significantly to

morbidity, although no definitive conclusions can be drawn since the majority of the data is retrospective. Larger prospective studies stratifying patients by surgical type, anesthesia type, and preoperative cardiac risk factors are required to better quantify this problem and perhaps develop reproducible risk indices.

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