

# Perioperative Intravenous Corticosteroids Reduce the Risk of Atrial Fibrillation Following Cardiac Surgery

Halonen J, Halonen P, Järvinen O, et al. Corticosteroids for the prevention of atrial fibrillation after cardiac surgery: a randomized controlled trial. *JAMA* 2007;297:1562–7.

## Study Overview

**Objective.** To determine if intravenous (IV) corticosteroids administered postoperatively reduce the incidence of atrial fibrillation (AF) in patients undergoing cardiac surgery.

**Design.** Randomized, double-blind, placebo-controlled trial.

**Setting and participants.** Participants scheduled for cardiac surgery were recruited between August 2005 and June 2006 from 3 academic hospitals in Finland. Patients had to be aged 30 to 85 years and undergoing their first coronary artery bypass graft (CABG), aortic valve replacement, or combination of CABG and aortic valve replacement surgery. Patients were excluded if they had a history of AF or flutter or peptic ulcer or thrombophlebitis, systemic infection, uncontrolled diabetes, Cushing syndrome, herpes simplex keratitis, psychotic mental disorder, or renal insufficiency.

**Intervention.** Patients were randomized to receive 100 mg IV hydrocortisone or matching placebo. The first dose was given on the evening of the operation day, with subsequent dosing every 8 hours over the next 3 days. All patients received metoprolol titrated according to heart rate.

**Main outcome measure.** Occurrence of AF within the first 84 hours following cardiac surgery. An episode of AF was defined as a period of at least 5 minutes or longer, in which there was an absence of regular P waves preceding the QRS complex, accompanied by an irregular ventricular rate.

**Main results.** All participants (121 intervention group; 120 placebo group) completed the appropriate number of infusions and no subjects were lost to follow-up. Baseline characteristics were similar between the 2 groups. The percentage of participants experiencing new-onset AF was significantly lower in the intervention group compared with the placebo group (30% vs. 48%; adjusted hazard ratio, 0.54 [95% confidence interval {CI}, 0.35–0.83];  $P = 0.004$ ). C-reactive protein levels (a measure of inflammation) were also significantly lower in the intervention group when compared with the placebo group. The investigators performed a meta-analysis

combining their study with 2 previous randomized controlled trials [1,2] and found a combined reduced risk ratio of 0.67 (95% CI, 0.54–0.84;  $P = 0.001$ ) for postoperative AF in participants receiving steroids compared with those receiving placebo.

**Conclusion.** IV corticosteroids appear to reduce the risk of postoperative AF in patients who have undergone cardiac surgery.

## Commentary

AF is a common complication following cardiac surgery. The mechanisms underlying this association are not entirely understood; however, it is believed that the systemic inflammatory response to surgery may play a role in the development of AF [3]. Levels of C-reactive protein are elevated in patients with AF, and prior work has demonstrated that corticosteroids reduce these levels in nonoperative AF [4,5]. In this well-designed, prospective, double-blind study, Halonen et al demonstrate a 37% reduction in postoperative AF risk in patients treated with IV corticosteroids. When combining their study with 2 similar trials [1,2], the overall reduction in risk was similar.

Postcardiac surgery AF is associated with significant morbidity and mortality and results in prolonged lengths of stay. Any therapy that may reduce this complication would be a welcome addition to clinical care. Yet, for the clinician, there are several additional questions that must be answered before IV corticosteroids can be implemented as a part of routine cardiac surgical care. First, steroids might increase the risk of postoperative infections. Although no difference was found in postoperative infection rates in this trial, the study was not designed to evaluate this endpoint specifically and additional, larger studies would be needed. Additionally, corticosteroids may increase the risk of gastric ulceration in critically ill patients. Nonetheless, this study strongly supports the efficacy of IV corticosteroids in preventing postoperative AF in patients undergoing cardiac surgery. Future studies should focus on the immediate safety concerns of using high-dose steroids in this patient population.

### Applications for Clinical Practice

IV corticosteroids reduce the risk of postoperative AF in patients undergoing CABG or aortic valve replacements. Steroids appear to be well tolerated; however, additional studies are required to ensure that the risk of postoperative infections is not increased.

—Review by Harvey J. Murff, MD, MPH

### References

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