Review: β-blockers, sotalol, amiodarone, and biatrial pacing all reduce atrial fibrillation after heart surgery

Crystal E, Connolly SJ, Sleik K, Ginger TJ, Yusuf S. **Interventions on prevention of postoperative atrial fibrillation in patients undergoing heart surgery. A meta-analysis.** Circulation. 2002;106:75-80.

QUESTION

In patients having heart surgery, what is the effectiveness of various pharmacologic and nonpharmacologic interventions in preventing atrial fibrillation (AF) and stroke, and decreasing the length of hospital stay?

DATA SOURCES

Studies were identified by searching MEDLINE, EMBASE/Excerpta Medica, CINAHL, and the Cochrane CENTRAL database until April 2001; abstract books and compact disks from several annual meetings between 1997 and March 2001; and bibliographies of relevant studies and reviews.

STUDY SELECTION

Studies were selected if they were randomized controlled trials evaluating the effectiveness of β-blockers, amiodarone, sotalol, or pacing compared with placebo or usual care in the primary prevention of postoperative AF in patients having coronary artery bypass graft surgery or combined coronary graft and valvular surgery. Treatment had to be started just before, during, or immediately after surgery.

DATA EXTRACTION

Data were extracted independently by 3 reviewers on number of patients; type and route of intervention; incidence of AF or supraventricular tachyarrhythmia, length of hospital stay, and stroke.

MAIN RESULTS

52 trials met the selection criteria. Pooling data from the trials showed that β-blockers (27 trials involving 3840 patients), sotalol (8 trials involving 1294 patients), and amiodarone (9 trials involving 1384 patients) all reduced AF (Table). Biatrial pacing (8 trials involving 744 patients) also reduced AF (odds ratio 0.46, 95% CI 0.30 to 0.71). Amiodarone was the only pharmacologic treatment that reduced length of hospital stay (decrease of 0.91 d, CI 0.2 to 1.6). Biatrial pacing also reduced length of hospital stay by 1.54 days (CI 0.2 to 2.6). Combining the data from 14 trials showed no difference between the treatment and control groups for stroke.

CONCLUSIONS

In patients having heart surgery, β-blockers, sotalol, amiodarone, and biatrial pacing all reduce atrial fibrillation. Amiodarone and biatrial pacing also reduce length of hospital stay.

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For correspondence: Dr. E. Crystal, Hamilton General Hospital, Hamilton, Ontario, Canada. E-mail crystal@bgumail.bgu.ac.il.

Pharmacologic intervention vs placebo or usual care (control) to prevent atrial fibrillation after heart surgery*

Comparisons	Weighted event rates	RRR (95% CI)	NNT (CI)
β-blocker vs control	16% vs 33%	51% (38 to 63)	6 (5 to 8)
Sotalol vs control	17% vs 37%	54% (40 to 64)	6 (5 to 7)
Amiodarone vs control	22% vs 37%	41% (29 to 52)	7 (6 to 10)

*Abbreviations defined in Glossary; RRR, NNT, and CI calculated from the odds ratios and CIs reported by the author.

COMMENTARY

AF is common after heart surgery. In addition to possible embolic events, patients with postoperative AF may have palpitation, myocardial ischemia, consequences of low cardiac output, congestive heart failure, hypotension, and emotional distress. They may also have adverse effects from the various therapies used.

The meta-analysis by Crystal and colleagues has established that preoperative administration of β-blockers in general, sotalol, and amiodarone are protective against postoperative AF. The study also shows that in spite of a decline in the incidence of postoperative AF, the stroke rate did not decrease. This may be because many of the strokes were not related to AF but were secondary to other cardiogenic sources or to carotid or aortic plaque. It was disappointing to note that only one drug—amiodarone—resulted in a shorter hospital length of stay, an important economic goal.

At present, the ACC/AHA/ESC guidelines (1) recommend administration of β-blockers to all patients without contraindications who are having heart surgery. We agree with this recommendation. Sotalol and amiodarone are recommended (with a lower level of supporting evidence) only for patients who are at increased risk for postoperative AF (e.g., those with previous AF, valvular heart disease, or left atrial dilatation).

This meta-analysis does not provide information about the complications associated with sotalol or amiodarone administration. Serious, sometimes unpredictable, and even lethal complications have been described with use of these drugs, especially in patients with organic heart disease who do not have AF alone. In fact, a higher rate of adverse drug effects has been recently documented with a "rhythm control" strategy in patients with AF (2). Therefore, before these drugs can be routinely recommended for the prevention of postoperative AF, additional analysis of their risk–benefit ratio is necessary.

This review also evaluated the use of biatrial pacing for the prevention of postoperative AF. Pacing was successful in preventing AF and decreasing length of stay. However, it requires additional equipment, monitoring, and expertise and may have its own complications. Risk–benefit and cost analyses are also necessary for this intervention before routine pacing can be recommended to prevent postoperative AF.

Itzhak Kronzon, MD
Paul A. Tunick, MD
New York University School of Medicine
New York, New York, USA

References

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