Temporary atrial epicardial pacing as prophylaxis against atrial fibrillation after heart surgery: a meta-analysis


CRD summary
This review assessed the short-term use of pacemakers to prevent atrial fibrillation after heart surgery. The authors concluded that evidence supports the use of pacemakers. The review had a limited search, review methods were not always reported and there was some confusion about numerical values in the paper. These factors make it difficult to assess the reliability of the conclusions.

Authors' objectives
To assess the effect of pacing therapies for the prevention of new-onset atrial fibrillation following cardiac surgery.

Searching
MEDLINE, bibliographies of identified studies and the authors’ files were searched for studies published between January 1995 and December 2001. Only peer-reviewed full-length articles published in English were eligible for inclusion.

Study selection
Study designs of evaluations included in the review
Only randomised controlled trials (RCTs) were sought.

Specific interventions included in the review
Studies assessing temporary epicardial atrial pacing were sought. The pacemakers could be located in the right atrium, left atrium or biatrial. Pacing algorithms were either fixed high-rate pacing or overdrive pacing. Pacing continued for one to five days in the included studies. The participants in the comparator groups were fitted with epicardial electrodes, but pacing therapy was either not provided or the pacing mode was AA1 at about 40 paces per minute. Some of the included participants were also taking beta-blockers, but none were taking class I or III anti-arrhythmic drugs.

Participants included in the review
The authors looked for studies on people undergoing cardiac surgery. In the included studies, the majority of the participants were undergoing coronary artery bypass graft. Between 60 and 86% of the participants were men. Some also had diagnoses of hypertension, diabetes, chronic obstructive pulmonary disease, myocardial infarction, or prior atrial fibrillation.

Outcomes assessed in the review
The main outcome of interest was the incidence of new-onset atrial fibrillation. Any adverse events or complications were also recorded. The results were reported according to each combination of pacemaker location and mode of pacing.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. The extracted data included details of the study design, method of pacing (site of pacing and mode), participants’ characteristics and outcomes. Odds ratios (OR) and 95% confidence intervals (CIs) were calculated for outcomes in the individual studies.

**Methods of synthesis**

How were the studies combined?
The treatment and control groups were compared using a chi-squared analysis. The ORs were calculated using the Mantel-Haenszel method. The authors stated that the results were presented as relative risk reductions; however, the results would appear to be summary ORs with 95% CIs.

How were differences between studies investigated?
The authors did not state how any differences between the studies were assessed.

**Results of the review**

Eight RCTs (812 participants) were included. Some studies included two or more comparisons of differing pacing sites. Six studies (621 participants) assessed overdrive pacing; of these, four study arms assessed biaxial pacing, five right atrial pacing and two left atrial pacing. Two studies (191 participants) assessed fixed high-rate pacing; of these, two study arms assessed biaxial pacing and one right atrial pacing.

Overdrive pacing.

Overdrive biaxial pacing and right atrial pacing both reduced the incidence of post-operative atrial fibrillation compared with the control; the ORs were 2.6 (95% CI: 1.4, 4.8) and 1.8 (95% CI: 1.1, 2.7), respectively.

The incidence of atrial fibrillation with overdrive left atrial pacing (28%) was not significantly different from that of patients assigned to the control (39%) (P=0.2). The authors considered these studies to be underpowered for assessing efficacy.

Fixed high-rate pacing.

The odds of atrial fibrillation occurring was 2.5 times lower in the group that received fixed high-rate biaxial pacing compared with the odds of atrial fibrillation occurring in the control group (OR 2.5, 95% CI: 1.3, 5.1).

The incidence of atrial fibrillation with fixed high-rate right atrial pacing (29%) was not significantly different from that of patients assigned to the control (33%) (P=0.7). The authors considered this study to be underpowered for assessing efficacy.

Complications.

The authors stated that the complications reported in the studies were similar to those described after heart surgery. No study reported problems related to the placement or removal of atrial electrodes.

**Authors’ conclusions**

Overdrive biaxial and right atrial pacing, as well as fixed high-rate biaxial pacing, reduced the risk of new-onset atrial fibrillation after cardiac surgery.

**CRD commentary**

The aims of this review were clearly stated. Only one database was searched and the search was limited to peer-reviewed publications in English. Unpublished studies were not sought and it is possible that other studies were missed. This may have introduced bias into the review. The methods of the review (study selection, quality assessment and data extraction) were not described. Subjective decisions made in these processes could affect the results of the review. The
authors did not discuss the possibility of any heterogeneity between the studies, although the analysis was stratified by pacing modalities.

There was some confusion in the paper in relation to the number of participants: because some studies had two or more arms it appears that the control groups have been counted more than once, this means that some analyses were based on relatively small numbers of participants. In addition, there seemed to be some confusion between numbers in the text and tables. The summary OR are the odds to the effect of no therapy versus pacing therapy, not the reciprocal as stated in the paper. The authors' conclusions should be considered in the light of these comments.

**Implications of the review for practice and research**
Practice: The authors stated that this review supports the use of temporary epicardial pacing immediately following cardiac surgery. Decisions about the location of the devices may be guided by ease of implementation.

Research: The authors stated that future studies should assess the effect of improved epicardial leads, alternative pacing sites (e.g. Bachmanns' bundle), advanced pacing algorithms and hybrid therapies on post-operative atrial fibrillation.

**Bibliographic details**

**PubMedID**
12693490

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Atrial Fibrillation /epidemiology /prevention & control /therapy; Cardiac Pacing, Artificial /classification /methods /statistics & numerical data; Heart Atria; Humans; Postoperative Complications /epidemiology /prevention & control; Randomized Controlled Trials as Topic; Thoracic Surgery /classification /statistics & numerical data; Treatment Outcome

**AccessionNumber**
12003009417

**Date bibliographic record published**
30/09/2004

**Date abstract record published**
30/09/2004

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.