Radiofrequency catheter ablation of the pulmonary veins for treatment of atrial fibrillation
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CRD summary
This review concluded that radiofrequency catheter ablation was superior to medications for maintaining sinus rhythm in patients with atrial fibrillation and superior to atrioventricular nodal ablation in patients with congestive heart failure, symptomatic atrial fibrillation and uncontrolled heart rate. Though broadly reliable, these conclusions are based on a small number of studies that reported 12 months follow-up or less.

Authors' objectives
To determine whether radiofrequency catheter ablation improves health outcomes when used to treat patients with atrial fibrillation.

Searching
An earlier search of MEDLINE from 1990 to March 2006 for relevant English-language studies was updated to January 2009. Search terms were reported. Bibliographies of relevant reviews and clinical studies were searched.

Study selection
Randomised controlled trials (RCTs) that compared percutaneous catheter ablation of the pulmonary vein against an alternative rate or rhythm control method for atrial fibrillation were eligible for inclusion. Studies needed to enroll 25 or more patients per treatment arm. Eligible RCTs had to report at least one of the following outcomes: survival, cardiovascular events, recurrence of atrial fibrillation, quality of life, exercise tolerance and complications of treatment.

Among included RCTs, patients were adults with paroxysmal or persistent atrial fibrillation, or both atrial fibrillation and congestive heart failure. Catheter ablation techniques were either pulmonary vein isolation or circumferential pulmonary vein ablation; all approaches used radiofrequency energy. Control treatments included anti-arrhythmic drugs or (in patients with atrial fibrillation and congestive heart failure) atrioventricular node ablation and pacing. Anticoagulation regimens varied between studies.

The authors did not state how the studies were selected for review.

Assessment of study quality
The quality of individual RCTs was evaluated using the United States Preventative Services Task Force Framework, which categorises studies as being of good, fair or poor quality based on five criteria related to comparability of groups, interventions, measurements and appropriate analysis of outcomes.

The authors did not state how many reviewers performed the assessment.

Data extraction
Data were extracted on relevant clinical outcomes, including p values for any comparisons.

The authors did not state how data were extracted.

Methods of synthesis
The studies were combined in a narrative synthesis. Studies were divided into three groups according to the patient population receiving treatment: first-line treatment of patients with recent onset paroxysmal atrial fibrillation; treatment of symptomatic patients with paroxysmal or persistent atrial fibrillation who have failed antiarrhythmic drugs; treatment of patients with atrial fibrillation and congestive heart failure who have failed standard medication regimens.

Results of the review
A total of six RCTs (n=744) were included in the review. One of these was rated as being of good quality and five were rated as fair.

First-line treatment of patients with recent onset paroxysmal atrial fibrillation (one RCT, n=67): Patients who received catheter ablation had significantly lower recurrence of atrial fibrillation than those who received antiarrhythmic drugs (13% versus 63%, p<0.001).

Treatment of symptomatic patients with paroxysmal or persistent atrial fibrillation who have failed antiarrhythmic drugs (four RCTs, n=593): All four RCTs reported large statistically significant reductions in atrial fibrillation recurrence at one year follow-up that favoured treatment using catheter ablation (range 47% to 70%). One RCT reported an improvement that favoured catheter ablation on six of eight SF-36 quality of life subscales. One RCT reported significant within-group improvement in symptoms from baseline in the catheter ablation group (p=0.02).

Treatment of patients with atrial fibrillation and congestive heart failure who have failed standard medication regimens (one RCT, n=81): Patients who received atrioventricular node ablation had significantly lower recurrence of atrial fibrillation than those who received pulmonary vein isolation (26% versus 96%, p<0.001).

None of the RCTs provided adequate information on cardiovascular events or complications.

Authors' conclusions
The current evidence base established that radiofrequency catheter ablation was superior to medications for maintaining sinus rhythm in patients with atrial fibrillation. The evidence suggested that patients with class II or III congestive heart failure and symptomatic atrial fibrillation in whom heart rate was uncontrolled had better outcomes following catheter ablation of the pulmonary veins than with atrioventricular nodal ablation and pacemaker insertion.

CRD commentary
The review question was clearly defined in terms of the participants, interventions, comparators, outcomes and study designs of interest. The search was limited to only one database and only to English-language studies, but it appeared that all the relevant RCT evidence was identified. Quality of individual studies was assessed using published criteria, although it was unclear whether measures were taken to minimise potential for errors and bias during the review process. The decision to combine the included studies in a narrative synthesis instead of a meta-analysis appeared justifiable. The authors' conclusions followed from the evidence presented. Although the conclusions appear broadly reliable, it should be noted that the review did not include any evidence on outcomes beyond 12 months' follow-up and the conclusions relating to patients with congestive heart failure are based on a single relatively small six-month trial.

Implications of the review for practice and research
Research: The authors stated that larger trials with longer follow-up and that reported important clinical outcomes and complications were required; they briefly described such trials that were ongoing.

The authors did not state any implications for practice.

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