Radiofrequency catheter ablation for cardiac arrhythmias: a clinical and economic review


Authors' objectives
To evaluate the clinical efficacy and cost-effectiveness of radiofrequency energy (RFA) catheter ablation for cardiac arrhythmias (specifically tachycardias).

Searching
MEDLINE, HealthSTAR, EMBASE, BIOSIS Previews, Pascal, SciSearch and the Cochrane Library were searched from 1985. The latest search for the review was conducted on November 5, 2001. In addition, the websites of Health Technology Agencies and the NHS Centre for Reviews and Dissemination were searched, and handsearches of the bibliographies of selected papers and documents in the CCOHTA library collection were performed. There were no language restrictions.

Study selection
Study designs of evaluations included in the review
All designs of study were eligible for inclusion in the review, with the exception of case reports and small, uncontrolled observational studies of fewer than 10 patients.

Specific interventions included in the review
Studies that investigated catheter ablation delivered by RFA were eligible.

Participants included in the review
Studies of adult patients suffering from tachycardia were eligible.

Outcomes assessed in the review
The primary outcomes of interest were those pertaining to RFA for cardiac arrhythmias, such as acute procedural success rates, in addition to recurrence rates over a follow-up period and complications. The secondary outcomes included functional capacity and quality of life.

How were decisions on the relevance of primary studies made?
Two reviewers independently screened all the citation titles and abstracts retrieved. This was followed by a full-text review of selected articles.

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 of the reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative review. They were grouped by category according to arrhythmia type conducive to ablation: pre-excitation syndromes-accessory pathway ablation (18 studies); atrioventricular (AV) node re-entrant tachycardia-slow AV node pathway ablation (22 studies); isthmus dependant atrial flutter ablation (16 studies); ablation of other atrial tachycardias (including sinus tachycardias) (9 studies); ablation of atrial fibrillation (AV node ablation, AV node modification, linear ablation, and focal and pulmonary vein ablation) (29 studies); and ventricular...
tachycardia (VT) ablation (18 studies). Within each category, where sufficient data existed, the data were tabulated.

How were differences between studies investigated?
Within each category, study designs and other between-study differences were described.

**Results of the review**
Of the 111 studies included in the review, only 10 were randomised controlled trials (RCTs).

The studies reviewed reported high procedural success rates of more than 75% for catheter ablation using RFA of paroxysmal supraventricular tachycardia (pre-excitation syndromes, AV node re-entry), atrial flutter and focal atrial tachycardias. These rates were sustained over one or two years' follow-up. The complication rates in most of these studies were reported to be close to 5%. There was some evidence that the elimination of these tachycardias improves symptoms and/or quality of life. The clinical benefits of atrial flutter ablation were diminished in patients with concomitant atrial fibrillation. The studies on the clinical efficacy of RFA in VF and in VT secondary to underlying structural heart disease generally reported lower success rates. These findings were based almost exclusively on observational studies, many with only small numbers of patients.

**Cost information**
Yes. Three cost-effectiveness studies, 12 cost studies, and 6 studies of quality of life (some with costs) were reviewed. In adult patients with either symptomatic paroxysmal supraventricular tachycardia or VT patients with implantable cardioverter defibrillators who experience frequent recurrences, RFA dominates drug therapy options with a cost-effectiveness ratio within US$21,000 per quality-adjusted life-year. Specifically, in adult patients with Wolf Parkinson White (WPW) syndrome, the range of cost-effectiveness for RFA varies depending on the baseline risk, but seems to dominate other options of drug therapy, surgical therapy or observation, or lies within the above cost-effectiveness ratio. RFA is not cost-effective in the treatment of asymptomatic WPW syndrome adult patients of any age.

**Authors' conclusions**
Catheter ablation for most cardiac arrhythmias is associated with good procedural success rates, but there remains insufficient evidence to draw specific conclusions about its long-term effectiveness and cost-effectiveness. There is a lack of comparisons with other therapies for cardiac arrhythmias.

**CRD commentary**
This review addressed a clinically relevant question, although the inclusion criteria were not stated clearly. The literature search was adequate and it is unlikely that significant other studies were missed. The nature of the studies included was not detailed and quality was not assessed. Overall, the findings presented in the review appear to be based on uncontrolled observational studies and, therefore, the summarised results are perhaps over stating the efficacy of the interventions. The authors' conclusions are suitably cautious.

**Implications of the review for practice and research**
Practice: The authors state that RFA is considered primarily as an adjunct procedure to pacemaker implantation for AF, and to anti-arrhythmic drugs and implantable cardioverter defibrillator therapy for VT.

Research: The existing findings need to be supported by results from controlled clinical trials.

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