Meta-analysis of the effect of radiofrequency catheter ablation on left atrial size, volumes and function in patients with atrial fibrillation


CRD summary
This review found that successful radiofrequency catheter ablation significantly decreased left atrial size and volumes and did not seem to adversely affect left atrial function. These conclusions should be interpreted with some caution due to the possibility of missing studies and unclear methodological quality and small size of the included studies.

Authors' objectives
To determine the effects of radiofrequency catheter ablation (RFCA) on left atrial size, volumes and function in patients with atrial fibrillation.

Searching
MEDLINE, Web of Science and Cochrane Central Register of Controlled Trials (CENTRAL) were searched in April 2009. Search terms were reported. Reference lists of retrieved studies were screened. The review was restricted to English-language studies.

Study selection
Studies that examined the effects of RFCA on left atrial size, volume and function in patients with atrial fibrillation were eligible for inclusion. Studies had to perform follow-up imaging at least one month after RFCA.

Studies included patients in paroxysmal, chronic and persistent atrial fibrillation. Mean age ranged from 52 to 60 years. The proportion of men ranged from 66% to 91%. Some studies included patients with comorbidities that included mitral regurgitation, coronary artery disease, circumferential pulmonary vein ablation, diabetes mellitus, hypertension, ischaemic cardiomyopathy, valvular disease and structural heart disease. Mean duration of atrial fibrillation ranged from 2.6 to 12 years. Success rate of RFCA ranged from 47% to 82%.

Two reviewers independently assessed studies for inclusion.

Assessment of study quality
Study quality was assessed based on study design, representativeness of the study participants, reporting of loss to follow-up and limitations and biases.

The authors did not state how many reviewers assessed validity.

Data extraction
Two reviewers independently extracted data to calculate mean differences and 95% confidence intervals (CIs) for continuous data.

Methods of synthesis
Weighted mean differences (WMDs) were estimated using DerSimonian and Laird random-effects models. Analyses were repeated using fixed-effect models to ensure the robustness of the model chosen. Heterogeneity was assessed using Q and I² statistics. Sensitivity analyses were conducted to determine the effects of excluding studies with lower left ventricular ejection fractions (<50%), fewer than 30 patients, shorter duration of follow-up and analyses based on atrial fibrillation recurrence.

Results of the review
Seventeen studies (n=869) were included. Sample size ranged from 13 to 120. Duration of follow-up ranged from 1.5 to 21 months. Most studies were retrospective and enrolled consecutive patients.
Compared to pre-ablation, left atrial diameter (WMD -1.67 mm, 95% CI -2.80 to -0.54), left atrial maximum volume (WMD -6.57, 95% CI -10.09 to -3.05) and left atrial minimum volume (WMD -2.61, 95% CI -5.13 to -0.09) were significantly decreased during follow-up after ablation therapy. When restricted to patients with atrial fibrillation recurrences these differences were no longer significant, although they remained significant in the set of studies of patients without atrial fibrillation recurrence. There were no significant differences in left atrial ejection fraction or left atrial active emptying fraction. When restricted to patients with atrial fibrillation recurrence there were significant decreases in both these measures; these differences were not significant for patients without atrial fibrillation recurrence. There was substantial heterogeneity for all these outcomes.

Results of sensitivity analyses were reported; these did not alter the review findings. There was some evidence of publication bias.

Authors' conclusions
Successful RFCA in patients with atrial fibrillation significantly decreased left atrial size and volumes and did not seem to adversely affect left atrial function.

CRD commentary
The review addressed a focused question supported by clearly defined inclusion criteria. The literature search only involved three databases. No specific attempts were made to locate unpublished studies. The review was restricted to English-language studies. There was, therefore, a possibility that relevant studies were missed. The review found some evidence of publication bias. Appropriate steps were taken to minimise bias and errors during study selection and data extraction; it was unclear whether such steps were taken during quality assessment. It appeared that study quality was formally assessed, but exact details of the items assessed and detailed results were lacking and this made it difficult to judge the reliability of the included studies. Appropriate methods were used to synthesise results. There was and appropriate assessment and investigation of heterogeneity.

The authors' conclusions were supported by the data, but should be interpreted with caution due to the small possibility of missing studies and unclear methodological quality and small size of the included studies.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that future studies should consider the timing of left atrial functional assessments as an important factor in study designs and allow adequate time for the recovery of left atrial function. There was a need to consider the quantification of atrial fibrillation burden in the recovery period.

Funding
Not stated.

Bibliographic details

PubMedID
20403486

DOI
10.1016/j.amjcard.2009.12.046

Original Paper URL
http://dx.doi.org/10.1016/j.amjcard.2009.12.046
Indexing Status
Subject indexing assigned by NLM

MeSH
Atrial Fibrillation /physiopathology /surgery /ultrasonography; Atrial Function /physiology; Cardiac Volume /physiology; Catheter Ablation; Heart Atria /physiopathology; Humans; Postoperative Period

AccessionNumber
12010002977

Date bibliographic record published
22/09/2010

Date abstract record published
06/04/2011

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.