

# Microwave ablation for atrial fibrillation in association with other cardiac surgery

Interventional procedures guidance

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[nice.org.uk/guidance/ipg122](https://www.nice.org.uk/guidance/ipg122)

## Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

## 1 Guidance

- 1.1 Current evidence on the safety and efficacy of microwave ablation for atrial fibrillation in association with other cardiac surgery appears adequate to support the use of this procedure provided that the normal arrangements are in place for consent, audit and clinical governance.

- 1.2 Patient selection and follow-up should be carried out by a multidisciplinary team. Cardiac surgeons undertaking this procedure should have specific training in the use of microwave energy equipment.

## 2 The procedure

### 2.1 *Indications*

- 2.1.1 Atrial fibrillation is the irregular and rapid beating of the upper two chambers of the heart (the atria). It may be classified as paroxysmal, persistent or permanent. It is the most common type of arrhythmia and the incidence increases markedly with age. Patients with atrial fibrillation may be asymptomatic or they may have symptoms such as palpitations, dizziness and breathlessness. They also have an increased risk of stroke as a result of blood clots forming in the left atrium and then embolising to the brain.
- 2.1.2 Atrial fibrillation usually occurs in the absence of structural heart disease. However, if structural heart disease is present, it is most commonly mitral stenosis.
- 2.1.3 Conservative treatments include medication, electrical cardioversion to control the heart rhythm and anticoagulants to prevent the formation of blood clots. The conventional surgical approach, known as the Cox maze procedure, involves making multiple, strategically placed incisions in both atria to isolate and stop the abnormal electrical impulses. Alternative methods of creating lesions in the atria by ablation have been developed, using energy sources such as radiofrequency, cryotherapy and ultrasound.

### 2.2 *Outline of the procedure*

- 2.2.1 Microwave ablation for atrial fibrillation is typically carried out in patients undergoing concomitant open heart surgery (often mitral valve replacement or repair). The procedure uses thermal damage, rather than incisions, to block impulse conduction. The heat generated by a flexible microwave probe coagulates the heart tissue, forming linear scars or lesions that disrupt the transmission of the abnormal electrical impulses. The procedure may be carried out on both atria or on the left atrium only. It can be performed from within or outside the atrium.

## 2.3 *Efficacy*

- 2.3.1 In one randomised controlled trial, patients treated with open heart surgery and microwave ablation were compared with those treated with open heart surgery alone. Immediately after the surgery, 92% (22/24) of patients who had microwave ablation were in sinus rhythm compared with 32% (6/19) of patients in the control group ( $p = 0.05$ ). At 12 months, 80% (12/15) of patients who had microwave ablation were in sinus rhythm compared with 33% (3/9) of control patients ( $p < 0.05$ ). A non-randomised controlled trial reported that 62% (84/136) of patients treated with microwave ablation were in sinus rhythm at 12 months, compared with 10% (5/51) of patients having heart surgery without microwave ablation ( $p = 0.0001$ ). A second non-randomised controlled trial that compared patients who had microwave ablation with those who had radiofrequency ablation reported no significant difference in the number of patients in sinus rhythm at 12 months; the results were 59% (13/22) for the microwave ablation group and 57% (8/14) for the radiofrequency ablation group.
- 2.3.2 Case series reported that 61% (25/41) and 76% (32/42) of patients who had microwave ablation were in sinus rhythm immediately after surgery. In a further case series, 62% (74/119) of patients were in sinus rhythm at 12-month follow-up. For more details, refer to the Sources of evidence.
- 2.3.3 The Specialist Advisors considered this procedure to be a variation on the Cox maze technique.

## 2.4 *Safety*

- 2.4.1 This procedure is performed during open heart surgery; therefore it is difficult to differentiate the complications that relate specifically to microwave ablation.
- 2.4.2 The main complications reported were in-hospital mortality and the requirement for a permanent pacemaker. In the randomised controlled trial, the in-hospital mortality was 4% (1/24) for patients treated with microwave ablation and heart surgery, compared with 5% (1/19) for patients who had heart surgery only. Four other studies reported in-hospital mortality rates, which ranged from 0% (0/42) to 4% (1/23). Four studies reported the proportion of patients who needed a permanent pacemaker; this ranged from 0% (0/41) to

23% (46/202). One study reported additional complications of bleeding in 9% (2/23) of patients; the need for an intra-aortic balloon pump in 4% (1/23); transient low cardiac output in 4% (1/23); and severe systemic inflammatory response syndrome in 4% (1/23). For more details, refer to the Sources of evidence.

2.4.3 The Specialist Advisors listed the potential adverse events as oesophageal injury, heart block, intra-operative myocardial infarction and excessive tissue damage.

## 2.5 *Other comments*

2.5.1 Most of the data were on patients having mitral valve surgery. There was only limited evidence on the efficacy of microwave ablation when performed with other procedures such as coronary artery bypass grafting.

2.5.2 This procedure appears to be more efficacious in patients whose atrial fibrillation has been of short duration (less than 1 year).

2.5.3 It was noted that there are variations in technique and microwave energy settings used for this procedure. It was also noted that it may be difficult to determine when full-thickness ablation has been achieved.

## 3 Further information

3.1 The Institute has published guidance on [radiofrequency ablation for atrial fibrillation](#) and [cryoablation for atrial fibrillation](#). The Institute is also currently developing a guideline for the diagnosis and treatment of atrial fibrillation [Now published as '[The management of atrial fibrillation](#)'].

Andrew Dillon  
Chief Executive  
May 2005

## *Sources of evidence*

The evidence considered by the Interventional Procedures Advisory Committee is described in the following document.

'Interventional procedure overview of microwave ablation for atrial fibrillation in association with other cardiac surgery', July 2004.

## *Information for patients*

NICE has produced [information on this procedure for patients and carers](#). It explains the nature of the procedure and the guidance issued by NICE, and has been written with patient consent in mind.

## 4 About this guidance

NICE interventional procedure guidance makes recommendations on the safety and efficacy of the procedure. It does not cover whether or not the NHS should fund a procedure. Funding decisions are taken by local NHS bodies after considering the clinical effectiveness of the procedure and whether it represents value for money for the NHS. It is for healthcare professionals and people using the NHS in England, Wales, Scotland and Northern Ireland, and is endorsed by Healthcare Improvement Scotland for implementation by NHSScotland.

This guidance was developed using the NICE [interventional procedure guidance](#) process.

We have produced a [summary of this guidance for patients and carers](#). Information about the evidence it is based on is also [available](#).

### Changes since publication

24 January 2012: minor maintenance.

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Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have

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## Contact NICE

National Institute for Health and Clinical Excellence  
Level 1A, City Tower, Piccadilly Plaza, Manchester M1 4BT

[www.nice.org.uk](http://www.nice.org.uk)

[nice@nice.org.uk](mailto:nice@nice.org.uk)

0845 033 7780

## *Endorsing organisation*

This guidance has been endorsed by [Healthcare Improvement Scotland](#).