

Microwave ablation for atrial fibrillation in association with other cardiac surgery

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.

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This guidance is written in the following context:

This guidance represents the view of the Institute which was arrived at after careful consideration of the available evidence. Health professionals are expected to take it fully into account when exercising their clinical judgement. This guidance does not, however, override the individual responsibility of health professionals to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Interventional procedures guidance is for health professionals and people using the NHS in England, Wales and Scotland.

This guidance is endorsed by NHS QIS for implementation by NHSScotland.

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 (www.nice.org.uk/IPG121guidance) and cryoablation for atrial fibrillation (www.nice.org.uk/IPG123guidance). The Institute is also currently developing a guideline for the diagnosis and treatment of atrial fibrillation. For further information, see www.nice.org.uk

Andrew Dillon
Chief Executive
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Information for the public

NICE has produced information describing its guidance on this procedure for patients, carers and those with a wider interest in healthcare. It explains the nature of the procedure and the decision made, and has been written with patient consent in mind. This information is available from www.nice.org.uk/IPG122publicinfo

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

Available from www.nice.org.uk/ip266overview

Ordering information

Copies of this guidance can be obtained from the NHS Response Line by telephoning 0870 1555 455 and quoting reference number N0863. *Information for the public* can be obtained by quoting reference number N0864.

The distribution list for this guidance is available from www.nice.org.uk/IPG122distributionlist

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