

Microwave ablation for treating primary lung cancer and metastases in the lung

Interventional procedures guidance

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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 Recommendations

- 1.1 There is evidence from imaging studies for the efficacy of microwave ablation for treating primary lung cancer and metastases in the lung, but evidence that the procedure improves clinical outcomes and quality of life is limited in quantity and quality. There is a risk of complications, including pneumothorax, which may have serious implications for patients with already compromised lung function. Therefore this procedure should only be used with special arrangements for clinical governance, consent and audit.
- 1.2 Clinicians wishing to undertake microwave ablation for treating primary lung cancer and metastases in the lung should take the following actions.
- Inform clinical governance leads in their NHS trusts.
 - Ensure that patients understand the uncertainty about the procedure's safety and efficacy and provide them with clear written information. In addition, the use of NICE's [information for the public](#) is recommended.
 - Audit and review clinical outcomes of all patients having the procedure.
- 1.3 Patient selection for microwave ablation for treating primary lung cancer and metastases in the lung should be carried out by a multidisciplinary team, which should normally include a thoracic surgeon, an oncologist and a radiologist.
- 1.4 This procedure should only be carried out by radiologists who regularly undertake image-guided interventional procedures.
- 1.5 NICE encourages further research into this procedure. Research studies should report details of patient selection and adverse events. Outcomes should include local tumour control, survival and quality of life.

2 Indications and current treatments

- 2.1 Lung cancer is one of the most common cancers in the UK. The symptoms often do not appear until the disease is advanced, and the prognosis is generally poor. There are 2 main types of primary lung cancer: small-cell lung cancer (which is fast growing and can spread quickly) and non-small-cell lung cancer (which

usually grows and spreads slowly; this includes cancers that grow in squamous cells or in the periphery of the lung). The lung is also a common site for metastases from other primary cancers such as breast and colon cancer.

- 2.2 Treatments for primary lung cancer or metastases in the lung include surgical resection, chemotherapy, radiotherapy, photodynamic therapy, thermal ablation, or a combination of these. If the tumour protrudes into the major airways, interventional bronchoscopic treatments including diathermy, laser therapy, cryotherapy, brachytherapy or photodynamic therapy may be used.

3 The procedure

- 3.1 Microwave ablation aims to destroy tumour cells and create localised areas of tissue necrosis with minimal damage to surrounding normal tissues. The potential benefits of the procedure compared with other thermoablative therapies such as radiofrequency ablation include the possibility of treating larger tumours and greater tumour volumes because of the convection profile and the higher intratumoural temperatures that may be achieved.
- 3.2 The procedure can be performed using local anaesthesia and sedation or with the patient under general anaesthesia, usually by a percutaneous approach. A probe is advanced into each targeted lesion under imaging guidance and the tumour ablated by delivering high-frequency microwave energy. Patients with larger tumours or multiple lesions may receive more than 1 pulse of energy at 1 treatment session. Electrodes may deliver energy through more than 1 needle.

4 Efficacy

This section describes efficacy outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the [overview](#).

- 4.1 A case series of 69 patients with primary or metastatic pulmonary malignancies reported overall survival rates at 1 year, 2 years and 3 years as 75%, 54% and 29% respectively in patients with non-small-cell lung cancer (n=48), and 48%, 24% and 14% respectively in patients with pulmonary metastatic tumours (n=21).

- 4.2 A case series of 50 patients with primary or metastatic disease reported that 26% (13/50) of patients in whom the procedure had initial technical success (defined as no detectable enhancement on the initial post-ablation CT scan; achieved in 95% [63/66] of ablations) had recurrent disease at the ablation site 6 months after the initial ablation.
- 4.3 In a case series of 80 patients with pulmonary metastases, the mean time to tumour progression after ablation was 6 months.
- 4.4 In the case series of 80 patients with pulmonary metastases, re-ablation of residual or recurrent lesions was performed in 49% (17/35) of lesions. Secondary tumour control (not otherwise defined) after re-ablation was successful in 53% (9/17) of these lesions, with no residual or recurrent tumour (within 6- to 9-month follow-up).
- 4.5 The specialist advisers listed completeness of treatment, overall survival, disease-free survival, progression-free survival and local control as key efficacy outcomes.

5 Safety

This section describes safety outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the [overview](#).

- 5.1 Pneumothorax (within 24 hours of the procedure) was reported in 9% (11/130) of procedures in the case series of 80 patients (130 lesions) with pulmonary metastases. Of these, 6 were categorised as 'mild' (treated conservatively), 4 were categorised as 'moderate' (managed with manual or catheter evacuation), and 1 was categorised as 'severe' (needing chest tube). Pneumothorax was reported in 32% (18/56) of patients after ablation in a case series of 56 patients with primary or metastatic disease (timing unclear). Of these patients 44% (8/18) needed chest tube insertion.
- 5.2 Haemothorax (within 30 days of the procedure) was reported in 3% (2/69) of patients in the case series of 69 patients with primary and metastatic pulmonary malignancies.

- 5.3 Bronchocutaneous fistula (diagnosed 12 hours after the procedure) was reported in a case report of a patient with adenocarcinoma: the fistula was no longer present at 2-month follow-up.
- 5.4 Abscess in a cavity resulting from the treatment was reported in 1 patient 6 months after the procedure in the case series of 50 patients with primary or metastatic disease. The patient developed haemoptysis and died 8 months after the procedure.
- 5.5 Needle tip fracture was reported in 1 patient in a case series of 23 patients and microwave antenna breakage was reported in a patient in a case report.
- 5.6 The specialist advisers listed anecdotal adverse events as pleural seeding, pulmonary haemorrhage, thermal damage to other structures in the lung and pain caused by burns to the chest wall.

6 Further information

Information for patients

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

About this guidance

NICE interventional procedures 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 procedures guidance process](#).

We have produced a [summary of this guidance for patients and carers](#).

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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 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.

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Endorsing organisation

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

Accreditation

