NICE National Institute for Health and Care Excellence

NICE guidance

MRI-guided focused ultrasound subthalamotomy for treating Parkinson's

HealthTech 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, and specifically any special arrangements relating to the introduction of new interventional procedures. 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.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

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. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

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.

Contents

This guidance replaces IPG797.

1 Recommendations

1.1 More research is needed on MRI-guided focused ultrasound subthalamotomy for treating Parkinson's before it can be used in the NHS.

1.2 This procedure should only be done as part of a formal research study and a research ethics committee needs to have approved its use.

What research is needed

1.3 More research in the form of suitably-powered randomised controlled trials or prospective cohort studies, and safety data from a registry, is needed on:

- patient selection, including severity of condition and symptoms
- the site of the lesion for this procedure
- the technique used
- long-term outcomes
- safety outcomes.

Why the committee made these recommendations

There is little evidence on the efficacy and safety of this procedure, including only 1 small randomised controlled trial. The evidence suggests the procedure may reduce Parkinson's symptoms including tremor. But the evidence is short-term and comes mainly from only 1 centre. So, the benefits of this procedure are unclear.

The evidence is mostly for advanced Parkinson's in people who had not had symptoms for long. They were also younger than most people with Parkinson's having treatment in the NHS. So, it is unclear who might benefit from this procedure.

This procedure also has the potential for serious complications. So, it can only be used in research.

2 The condition, current treatments and procedure

The condition

2.1 Parkinson's is a progressive neurodegenerative condition that damages the brain over many years. It is caused by a loss of the cells in the brain that produce dopamine, which helps to control and coordinate body movements. People with Parkinson's classically present with the symptoms and signs described as 'parkinsonism'. These include bradykinesia (slow movements), rigidity, rest tremor (shaking) and postural instability (loss of balance). In later stages of Parkinson's, other symptoms (sometimes described as the 'non-motor' manifestations of Parkinson's such as depression, cognitive impairment, dementia and autonomic disturbances) may be prominent. The condition may progress to cause significant impairments, adversely affecting quality of life and, indirectly, the quality of life of family and carers.

Current treatments

2.2 For people with early Parkinson's, drug treatments such as levodopa, other dopamine agonists and monoamine oxidase B inhibitors may be considered. In the later stages, other drugs may be used with levodopa (as adjuvants) to reduce the motor complications associated with prolonged levodopa use. Non-pharmacological management such as physiotherapy, occupational therapy and speech and language therapy may be considered. Invasive surgical procedures may be considered for Parkinson's that does not respond to medical and supportive therapies. These include deep brain stimulation and, less commonly, radiofrequency thalamotomy. Treatments for non-motor symptoms such as sleep disturbance and depression may also be considered.

The procedure

2.3 MRI-guided focused ultrasound subthalamotomy is an incisionless procedure that aims to treat tremor, slowness and stiffness associated with Parkinson's.

2.4 This outpatient procedure is done with the patient lying supine inside an MRI scanner for several hours. The patient's head is shaved, and a stereotactic head frame is attached. The person is usually kept awake during the procedure so they can be regularly assessed by the treating physician to evaluate the clinical response (any improvement in symptoms or adverse events). Some people may be offered light sedation.

2.5 Real-time MRI guidance and thermal mapping are used to identify and adjust the target area of the brain (the subthalamic nucleus) precisely and continuously monitor treatment. Low-power ultrasound is delivered to confirm the location. Then, several high-power focused ultrasound pulses are delivered to ablate tissue in the subthalamic nucleus (in the dorsolateral motor region and above, and mediodorsally to affect the pallidothalamic tract). The energy released and the location of the ultrasound focus are monitored in real time during the procedure by MRI thermometry, and adjusted to reach above the definitive ablation temperature (of 55°C) according to clinical response. Chilled water is circulated around the head during the treatment to prevent thermal damage to the scalp caused by the increase in bone temperature. The procedure is considered finished when there is sufficient clinical improvement, considering the total amount of energy delivered and the number of sonications. The procedure takes about 2 hours and symptom relief should be immediate.

3 Committee considerations

The evidence

3.1 NICE did a rapid review of the published literature on the efficacy and safety of this procedure. This comprised a comprehensive literature search and detailed review of the evidence from 7 sources, which was discussed by the committee. The evidence included 1 randomised controlled trial with a sub-study, and 5 prospective studies. It is presented in the summary of key evidence section in the overview. Other relevant literature is in the appendix of the overview.

3.2 The professional experts and the committee considered the key efficacy outcomes to be: improvement in motor features, functional improvement in activities of daily living, reduction in the use of antiparkinsonian medicine, quality of life and patient satisfaction.

3.3 The professional experts and the committee considered the key safety outcomes to be: speech problems, gait problems, new onset dyskinesia, facial asymmetry, pins and needles, and weakness on the treated side.

3.4 Patient commentary was sought but none was received.

Committee comments

3.5 The procedure is used unilaterally to treat Parkinson's with asymmetric symptoms and there have been some reports of staged bilateral use.

3.6 Targeting the subthalamic nucleus is designed to treat motor symptoms of Parkinson's including tremor. But a high incidence of undesirable neurological side effects, which may be permanent, have been reported in the literature.

3.7 The procedure may have an advantage over surgical and other minimally invasive procedures because it can create a more controlled lesion with real-time

monitoring and testing.

3.8 The procedure may have a role when a more invasive procedure, such as deep brain stimulation of the subthalamic nucleus, is indicated but is not suitable.

Update information

Minor changes since publication

January 2026: Interventional procedures guidance 797 has been migrated to HealthTech guidance 734. The recommendations and accompanying content remain unchanged.

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Endorsing organisation

This guidance has been endorsed by Healthcare Improvement Scotland.