NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

HealthTech Programme

GID-IPG10440 Middle meningeal artery embolisation for chronic subdural haematomas

Final scope

1 Introduction

The procedure included in this NICE HealthTech evaluation is middle meningeal artery embolisation to treat chronic subdural haematomas. Interventional procedures involve making an incision, a puncture or entry into a body cavity, or using ionising, electromagnetic or acoustic energy. NICE makes recommendations based on assessment of the efficacy and safety of new and significantly modified procedures or established procedures if there is uncertainty about their efficacy or safety. In cases where an interventional procedure involves implanting or using a health technology, the recommendations will focus on the procedure itself rather than the specific technology used.

This assessment is a review of the existing NICE interventional procedures guidance on middle meningeal artery embolisation for chronic subdural haematomas. This scope document describes the context and the scope of the assessment. The methods and process for the assessment follow the Interventional procedures programme manual and the NICE HealthTech programme manual.

2 Lay description

The brain is surrounded by a membrane called the dura. A subdural haematoma is a collection of blood in the space between the dura and the brain, usually caused by a head injury. The blood collection puts pressure on

the brain and affects how it works. A subdural hematoma is chronic if the blood has been present for some time, often weeks or months.

The aim of the procedure is to stop the bleeding and reduce pressure on the brain. Parts of the artery that supplies the dura with blood (the middle meningeal artery) are blocked (embolisation) under general or local anaesthesia. To reach the brain, a small tube (catheter) is inserted into an artery, usually in the thigh or forearm. A second, smaller catheter is then put through it to reach the middle meningeal artery. A blocking agent is then injected to embolise the artery.

3 The condition

A subdural haematoma is an accumulation of blood and blood degradation products in the space between the brain and one of its surrounding membranes (the dura). This space is referred to as the subdural space. A subdural haematoma is usually caused by a head injury. Haematomas can be acute, subacute or chronic. A haematoma is considered chronic if the blood has been present for some time, often weeks or months. The injury that causes a chronic subdural haematoma can be minor and, in some cases, a person may not even recall one. Research in the past decade has established that chronic subdural haematomas are not caused by head trauma alone and that inflammation also plays an important role (Eldmann et al. 2017).

The increase in pressure on the brain due to the collection of blood in the subdural space and the inflammatory processes can lead to a range of symptoms. These range from mild headaches to motor and cognition problems and reduced consciousness. Some people may not experience any symptoms at all.

Estimates of the incidence of chronic subdural haematoma range between 1.3 and 17.6 per 100,000 people per year with a rate of 48 per 100,000 people per year where data was collected in people over 65 only (Stubbs et al. 2021, Robinson et al. 2025). Clinical experts stated that the incidence in people over

65 is likely to be higher than published estimates, with rates up to 65 per 100,000 people per year.

The risk of developing a chronic subdural haematoma is higher in some people, including those who:

- are older
- are at an increased risk of falling
- are taking anticoagulants or antiplatelet medications (medication to thin their blood)
- are at an increased risk of bleeding or bruising due to another condition (such as a liver disease)
- have a haematological condition or a clotting disorder
- misuse alcohol.

4 Current practice

In the NHS, the management of chronic subdural haematomas follows the recommendations of the Clinical practice guidelines for the care of patients with a chronic subdural haematoma. The guidelines recommend that people identified to have a chronic subdural haematoma should be referred urgently to neurosurgery and receive diagnostic imaging and other appropriate investigations. Surgery should be considered in people with symptomatic haematomas and in those with minimal or no symptoms, but with radiological evidence of a large volume haematoma with mass effect (for example, significant midline shift of more than 5 mm). Surgical options include draining of the haematoma through a burr hole (burr-hole evacuation) or a craniotomy.

People who are asymptomatic or have minor symptoms and smaller haematomas are usually offered conservative treatment which involves careful monitoring and medical management such as temporarily stopping or reversing therapy with anticoagulants or antiplatelet medications. People for whom the surgical risk is too high would also receive conservative treatment.

The guidelines recommend against the use of corticosteroids to treat symptomatic chronic subdural haematomas and note that there is insufficient

evidence for the routine use of tranexamic acid, statins, ACE-inhibitors or other disease-modifying treatments in the management of chronic subdural haematomas.

If the chronic subdural haematoma comes back (recurrence of the haematoma), it can be treated again, with the same procedure or with a different one.

5 Unmet need

There is a high rate of recurrence following surgical drainage of a chronic subdural haematoma. Evidence suggests that this happens on average in 11% of cases, but potentially in up to a third of cases (Flood et al. 2024). Treatment failure often requires reoperation or surgical rescue, and can also cause complications such as stroke, myocardial infarction or death. Some people may be unable to start or restart anticoagulants or antiplatelet therapy after surgical drainage due to the risk of recurrence of the haematoma. But, this increases their risk of a stroke or a heart attack.

Some people are unable to undergo burr-hole evacuation or a craniotomy to drain the haematoma if their surgical risk is considered too high. High risk groups include older people, people who are frail, people who use anticoagulants or antiplatelet medications and people with comorbidities. These people have conservative management instead which is associated with high morbidity and mortality. A recent observational study has shown a mortality rate of 42% at one year follow up in people who had conservative therapy (Read and Eldman, 2025). In some people both evacuation surgery and conservative treatment are not appropriate as their symptoms are not severe enough for surgery and stopping anticoagulants or antiplatelet therapy could increase the risk of a stroke or a heart attack.

The incidence of chronic subdural haematomas is expected to rise as the British population ages and as anticoagulants or antiplatelet medications are used more frequently. This will lead to an increase in the number of people that need to be treated.

6 The procedure

Middle meningeal artery embolisation (MMAE) is a minimally invasive procedure in which the blood supply to the haematoma is restricted by injecting an embolic (blocking) agent into the middle meningeal artery. The purpose of the procedure is to stop the blood supply to the membrane around the haematoma, allowing the haematoma to resolve spontaneously and reducing the risk of recurrence.

The procedure is done by a trained interventional neuroradiologist, using general or local anaesthesia, under fluoroscopic guidance. A catheter is inserted into the common femoral or radial artery (or in certain rare cases, the temporal artery) and a microcatheter is then guided into the middle meningeal artery. Angiography is used to select branches for embolisation and to detect collateral vessels (secondary blood-vessels that connect the middle meningeal artery to other arteries). If there are no significant collateral vessels, target branches are embolised. If there are significant collateral vessels, MMAE may or may not be offered, depending on the feasibility and risk of doing the procedure. If it is offered, the collateral vessels are either occluded using coils before embolisation, or the microcatheter is advanced more distally to avoid them. The blocking agent is then injected into the middle meningeal artery. Once there is no flow in the target branches on angiography, the catheters are removed.

There are several embolic agents available, including liquid embolic agents, particle agents and coils. Liquid agents include copolymers dissolved in dimethyl sulfoxide and n-Butyl Cyanoacrylate (n-BCA); particle agents include polyvinyl alcohol and other less frequently used agents. They can also be used in combination. The embolic agents used for MMAE are established medical technologies which are also used for other embolisation procedures.

Embolic agents differ according to several aspects, including the extent of distal penetration, their radiopacity and visibility, need for contrast agent, ease of use and whether using dimethyl sulfoxide is required. These differences may affect agent selection by the clinician.

MMAE can be used for new or recurrent chronic subdural haematomas. The procedure can be done on its own or in addition to surgery (generally after the surgical procedure).

A multidisciplinary consensus statement on the current role of middle meningeal artery embolization (MMAE) in chronic subdural hematoma states that MMAE should be considered (where non-conservative management is needed):

- on its own (stand-alone therapy) for new or recurrent chronic subdural haematomas, when surgery is contraindicated or the surgical risk is considered too high
- in addition to surgery (adjunct therapy) for all recurrent chronic subdural haematomas.

This consensus statement is currently being updated to incorporate new evidence of the safety and efficacy of the procedure.

6.1 Innovative aspects of the procedure

MMAE is a minimally invasive procedure, which does not require creating an opening in the skull, which could lower the associated procedure risks like infection. In contrast with surgical procedures which drain the haematoma, MMAE aims to treat the haematoma by targeting the underlying source of bleeding.

6.2 Current known use of the procedure

The procedure is done in multiple NHS trusts, including North Bristol NHS Trust, South Tees Hospitals NHS Foundation Trust, University Hospital Southampton NHS Foundation Trust, Oxford University Hospitals NHS Trust, Barking, Havering and Redbridge University Hospitals NHS Trust, University College London Hospitals NHS Foundation Trust, King's College Hospital NHS Foundation Trust and Imperial College Healthcare NHS Trust.

7 Potential equality issues

NICE is committed to promoting equality of opportunity, eliminating unlawful discrimination and fostering good relations between people with protected characteristics (Equality Act 2010) and others.

Age is a significant risk factor for developing a chronic subdural haematoma. A history of falls or use of anticoagulants or antiplatelet medications are also risk factors and both are associated with older age. The incidence of chronic subdural haematomas is higher in men. People with chronic subdural haematomas are likely to be covered by the Equality Act 2010 if their condition has had a substantial adverse impact on normal day to day activities for over 12 months or is likely to do so (that is, they have a disability).

8 Decision problem

The key objective for this evaluation is to assess the efficacy and safety of MMAE for chronic subdural haematomas to determine whether it works well enough and is safe enough for use in the NHS.

Table 1: Decision problem

Population	People with chronic subdural haematomas
	If the evidence allows the following subgroups may be considered:
	• People who have had evacuation surgery (burr-hole evacuation or a craniotomy) in addition to MMAE
	• People who have not had evacuation surgery because:
	  ○ evacuation surgery is unsuitable or too high risk (for example due to treatment with anticoagulants or antiplatelet medication or due to frailty)
	  ○ evacuation surgery is an option, but it is not chosen

	○ evacuation surgery is not indicated due to no symptoms or symptoms being less severe • People who have MMAE for recurrent chronic subdural haematomas (with or without evacuation surgery)
Intervention	Middle meningeal artery embolisation (with a particle, liquid embolic agent, coil or in combination) as a stand-alone treatment or as an adjunct to evacuation surgery
Key efficacy outcomes (may include but are not limited to)	• Embolisation of the target vessel • Hematoma resolution • Hematoma recurrence • Hematoma progression • Need for further intervention (including conversion to surgical procedure or reoperation) • Independent ambulation • Change in haematoma size (e.g. width, thickness, volume or midline shift) • Length of hospital stay • Neurological disability (e.g. modified Rankin scale) • Independence in daily activity (e.g. Barthel Index) • Motor function • Cognitive function • Quality of life
Key safety outcomes (may include but are not limited to)	• Stroke or myocardial infarction • Mortality • Neurological complications • Facial droop • Visual loss

	• Procedure or device-related adverse events or complications • Access site bleeding or complications

9 NICE team

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Appendix A: Related evidence or guidance

Relevant emerging key trials and existing registries

NCT05267184 SWEMMA RCT (Expected publication date: March 2027)

NCT04750200/NCT04923984 EMMA-CAN RCT (Expected publication date: March 2026)

NCT05374681 LEADH RCT (Expected publication date: September 2026)

NCT06466733 PREMMA RCT (Expected publication date: July 2032)

NCT06163547 STORMM RCT (Expected publication date: January 2027)

NCT06347796 CHESS RCT (Expected publication date: September 2028)

NCT04742920 OTEMACS trial (Expected publication date: June 2026)

NCT04511572 ELIMINATE RCT (Recently completed, expected publication date not known)

NCT04270955 DAMMET RCT (Recently completed, expected publication date not known)

NCT04402632 EMBOLISE RCT (Recently completed, results published)

NCT04410146 STEM RCT (Recently completed, results published)

NCT04700345 MAGIC-MT RCT (Recently completed, results published)

NCT04372147 EMPROTECT RCT (Recently completed, results published)

NCT04816591 MEMBRANE RCT (Recently completed, results published)

North Bristol NHS Trust has set up a local registry which has recorded all MMAE procedures done in the trust following publication of the original guidance.

Related NICE guidance, standards or indicators

NICE interventional procedures guidance

Middle meningeal artery embolisation for chronic subdural haematomas (2023) NICE interventional procedures guidance 779 - **current guidance** (Recommendation: middle meningeal artery embolisation for chronic subdural haematomas should be used only in research)

Other related documents

Non-NICE clinical guidelines

Clinical practice guidelines for the care of patients with a chronic subdural haematoma: multidisciplinary recommendations from presentation to recovery

Multidisciplinary consensus-based statement on the current role of middle meningeal artery embolization (MMAE) in chronic SubDural hematoma (cSDH)