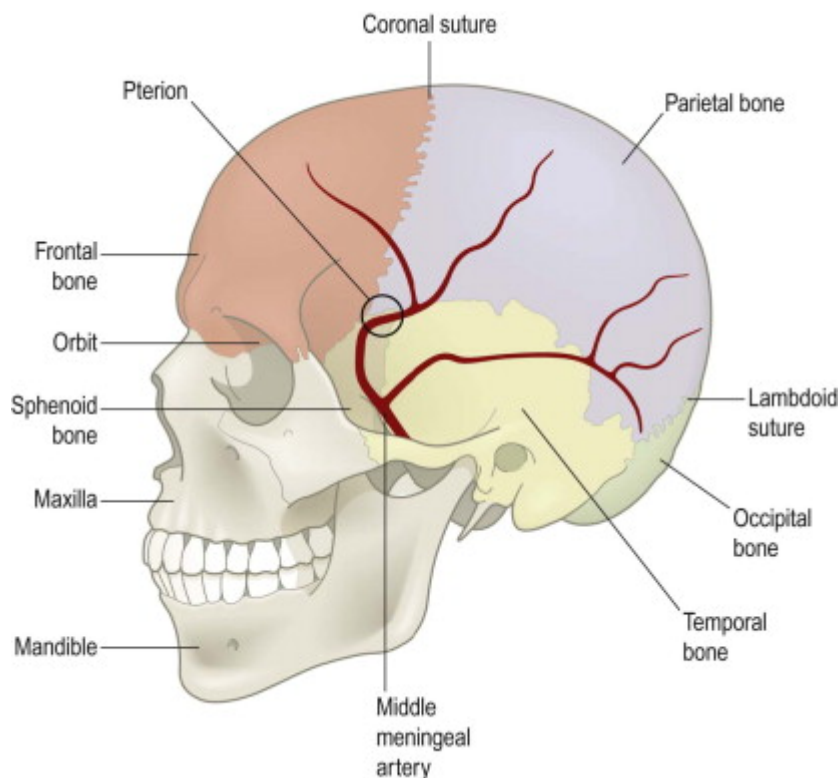


Middle meningeal artery embolization for chronic subdural hematoma

- [Statins and middle meningeal artery embolization: a literature review in the treatment of chronic subdural hematoma](#)
- [Comparative study between surgical drainage alone and adjuvant middle meningeal artery embolization with Histoacryl for the treatment and prevention of chronic subdural hematoma recurrence](#)
- [Middle meningeal artery \(MMA\) embolisation for chronic subdural haematomas: rationale and design for the STOp Recurrence of MMA Bleeding \(STORMM\) randomised control trial-a study protocol](#)
- [Early Experience With the Dual-Mode Radial-Access Catheter Armadillo in Neuroendovascular Procedures via the Radial Approach: A Multicenter Study of 71 Patients](#)
- [The effect of pre-treatment hematoma size and unilateral vs bilateral MMA embolization on volume reduction in the treatment of chronic subdural hematomas: A retrospective cohort study](#)
- [Order and Timing of Middle Meningeal Artery Embolization as a Perioperative Adjunct to Surgical Evacuation for Chronic Subdural Hematomas: A Multicenter Study](#)
- [Middle Meningeal Artery \(MMA\) Embolization for Recurrent Subacute Subdural Hematoma With Complete Resolution Following Transient Radiological Size Progression: A Case Report and Literature Review](#)
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Middle meningeal artery embolization is effective for [Chronic subdural hematoma recurrence](#), and is considered an effective therapeutic method to stop hematoma enlargement and promote resolution ¹⁾

2) 3) 4) 5) 6)

A pilot study indicated that perioperative [middle meningeal artery](#) (MMA) embolization could be offered as the least invasive and most effectual means of treatment for resistant patients of CSDHs with 1 or more recurrences ⁷⁾.

Chihara et al. have treated three cases of CSDH with MMA embolization to date, but there was a postoperative recurrence in one patient, which required a craniotomy for hematoma removal and capsulectomy. MMA embolization blocks the blood supply from the dura to the hematoma outer membrane in order to prevent recurrences of refractory CSDH. Histopathologic examination of the outer membrane of the hematoma excised during craniotomy showed foreign-body giant cells and neovascular proliferation associated with embolization. Because part of the hematoma was organized in this case, the CSDH did not resolve when the MMA was occluded, and the development of new collateral pathways in the hematoma outer membrane probably contributed to the recurrence. Therefore, in CSDH with some organized hematoma, MMA embolization may not be effective. Magnetic resonance imaging (MRI) should be performed in these patients before embolization ⁸⁾.

Perioperative prophylactic [Middle meningeal artery embolization](#) in the setting of surgical evacuation, via either craniotomy or [subdural evacuating port system](#) (SEPS), may help to lower the recurrence rate of cSDH ⁹⁾.

It can be used safely and effectively as an alternative or adjunctive [minimally invasive chronic subdural hematoma treatment](#) in elderly and advanced elderly patients ¹⁰⁾.

It has been proposed as a curative treatment for [chronic subdural hematoma](#) (cSDH), but [evidence](#) for the [indication](#) and [timing](#) is not definitive.

Complications

[Middle meningeal artery embolization for chronic subdural hematoma complications.](#)

Trials

[Middle meningeal artery embolization for chronic subdural hematoma trials](#)

Systematic Reviews

[Middle meningeal artery embolization for chronic subdural hematoma systematic reviews.](#)

Narrative reviews

The [incidence](#) and [prevalence](#) is expected to grow due to aging of the [population](#) and the increase in [anticoagulation](#) and anti-aggregation prescription [drugs](#). Traditionally, it was accepted that the bleeding originates from bridging [veins](#) that drain the brain towards the dural sinuses. However, recent findings exposed an additional underlying mechanism. Trauma leads to separation of the dural border cell layer which induces an inflammatory process that starts positive feedback of leaky blood vessels formation (angiodysgenesis), which causes blood product leakage that further increases the inflammation. For many years, the disease has been treated conservatively in cases of mild clinical and imaging features, or by surgical evacuation of the hematoma in more severe cases. The literature shows a consistent high recurrence rate of around 30% following a surgical removal of the blood. The newly discovered mechanism inspired the development of a novel treatment method for this entity. Endovascular embolization of the middle meningeal artery (MMA). This method has an excellent efficacy and safety profile, and it can be performed alone or in combination with surgical evacuation. A review of Milikovsky et al. presents the epidemiology and mechanisms underlying CSDH, in addition to possible treatment methods, and eventually discuss MMA embolization to increase the awareness of the medical community in [Israel](#) to this new approach ¹¹.

Case series

[Middle meningeal artery embolization for chronic subdural hematoma case series](#)

Case reports

A 70-year-old male with [ischemic heart disease](#), [diabetes mellitus](#), and [hypertension](#) who presented with worsening [headaches](#) for the past three days, associated with gait [imbalance](#) and [dizziness](#). The patient was vitally stable on examination with a Glasgow Coma Scale/Score (GCS) of 15/15; his pupils were reactive bilaterally; and his neurological examination was unremarkable. Non-contrast computed tomography (CT) of the head yielded acute and [Chronic Subdural Hematoma](#). The patient was initially managed by [middle meningeal artery embolization](#), but one day later he developed a stroke. Hence, [thrombectomy](#) and burr hole craniotomy were performed to manage the stroke and evacuate the chronic subdural hematoma (CSDH). This paper presents this case as uncommon acute on chronic SDH presented with headache and vertigo, treated with embolization and with complications of stroke and pulmonary embolism ¹².

A case of a 74-year-old male on aspirin with a history of recurrent symptomatic chronic right-sided subdural hematoma treated successfully with a SEPS and right middle meningeal artery embolization with poly vinyl alcohol (PVA) microparticles. The patient initially presented to the emergency department with headaches, difficulty walking, and left sided hemiparesis. CT Head showed a large chronic right-sided subdural hematoma measuring 2.7 cm thick with 1 cm of leftward shift. Patient underwent placement of a right-sided SEPS and the subdural hematoma decreased in size to 1.0 cm with 2 mm of leftward shift. The patient had resolution of headaches and neurological symptoms and was discharged home. Three months later, the patient returned to the emergency department with headache and left hand numbness. CT Head showed an acute on chronic right-sided subdural

hematoma measuring 1.4 cm with 3 mm of leftward shift. Patient underwent right-sided SEPS placement. Repeat CT Head showed reduction in the subdural hematoma to 1.2 cm. The SEPS was removed and the patient had resolution of neurological symptoms. The patient then had a diagnostic cerebral angiogram with PVA microparticle embolization of the right middle meningeal artery. A SEPS was placed at the time of the angiogram to further reduce the size of the subdural hematoma.

Repeat CT Head after SEPS and middle meningeal artery embolization showed decrease in size of the subdural hematoma. Follow-up CT Head showed stability of the subdural hematoma and patient had no further neurological symptoms. Patient was discharged home.

Middle meningeal artery embolization is a useful endovascular technique for reducing the arterial supply to the membranes in chronic subdural hematomas. Middle meningeal artery embolization can reduce the recurrence rate of subdural hematomas ¹³⁾.

In 1994 a rare case of [chronic subdural hematoma](#) associated with a middle meningeal arteriovenous fistula was treated by a combination of embolization and burr hole drainage. This clinical situation might be missed in this era of computed tomography, when cerebral angiography is seldom indicated for the diagnosis of neuro-traumatic diseases. We should bear in mind the possibility of this clinical situation of a chronic subdural hematoma associated with a linear skull fracture crossing the middle meningeal groove in order to avoid possible hemorrhagic complications during surgery for chronic subdural hematoma ¹⁴⁾.

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