

ARTEMIS™ Penumbra System

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There is growing [interest](#) and [evidence](#) in [spontaneous intracerebral hemorrhage](#) (ICH) evacuation with minimally invasive surgery (MIS). If early ICH evacuation becomes the standard of care, training neurointerventionalists to perform MIS would expand global access to treatment. We present a retrospective analysis of patients who underwent MIS-ICH evacuation performed by interventional neurologists in collaboration with neurosurgeons.

Method: Patients meeting prespecified criteria underwent MIS-ICH evacuation using the Artemis (Penumbra) by an interventional neurologist-neurosurgeon team. Baseline demographic, clinical, and radiographic characteristics were collected. Procedure location was recorded. The primary outcome of interest was the rate of symptomatic rebleeding. Secondary outcomes included hematoma reduction, serious adverse events, length of stay, disposition, and discharge and 6 month functional status.

Results: 19 patients were included in this analysis. One third of cases were performed in the neuroangiography suite using intraprocedural flat panel CT and the rest were performed in the operating room. All were performed under neuronavigation using AxiEM (Medtronic-Stealth-Station). There was a median 80% hematoma reduction from a median preoperative ICH volume of 31.1 mL (IQR 26.2-56.4). A post-procedural hematoma volume of <15 mL was achieved in 67% of cases, comparable with that seen in the [ENRICH trial](#) (Early Minimally Invasive Removal of Intracerebral Hemorrhage) trial (72.7%). No patients developed symptomatic post-procedural hematoma expansion.

Conclusion: This study suggests that MIS-ICH evacuation can be performed safely and effectively by trained neurointerventionalists. Our experience also supports the ability to perform MIS-ICH evacuation in the neuroangiography suite. We advocate for the development of a standardized neurointerventional training protocol and certification pathway for the performance of MIS-ICH evacuation with the goal of improving global access to care ¹⁾

MIND study

[MIND study](#)

1: Tekle W, Benites G, Miller S, Betancourt A, Hassan AE. Minimally invasive surgery for evacuation of intracerebral hematoma by neurointerventionalists: initial experience. J Neurointerv Surg. 2025 Jan 6;jnis-2024-022237. doi: 10.1136/jnis-2024-022237. Epub ahead of print. PMID: 39762031.

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1)

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