

Case Report

The Double Jeopardy: Successful Mechanical Thrombectomy for M2 Occlusion during the Apixaban Gap Post-Chronic Subdural Hematoma Evacuation

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Abstract: Chronic subdural hematoma (CSDH) is a frequent neurosurgical issue, but ischemic cerebrovascular accidents (CVA) following surgery for CSDH are rare and present significant clinical challenges, especially in patients requiring oral anticoagulation (OAC). This case describes an 87-year-old male with atrial fibrillation who developed acute right-sided weakness and aphasia due to an M2 segment occlusion of the left middle cerebral artery (MCA), two weeks after bilateral CSDH evacuation and OAC cessation (the "Apixaban Gap"). The patient underwent successful mechanical thrombectomy with TICI 3 reperfusion, demonstrating marked clinical improvement and favourable functional recovery within three months. This case underscores the risks associated with perioperative anticoagulant interruption in high-risk patients and highlights the therapeutic dilemma in managing concurrent hemorrhagic and thrombotic complications. The technical feasibility and benefit of mechanical thrombectomy for medium vessel occlusions (MeVO) in the post-neurosurgical context are discussed. Ultimately, the case supports individualized, multidisciplinary decisions for early intervention and timely re-initiation of OAC, showing that neither advanced age nor recent neurosurgical history should be absolute contraindications to life-saving stroke interventions when stringent selection and rapid workflows are maintained.

Keywords: Chronic Subdural Hematoma (CSDH), Ischemic Cerebrovascular Accident (CVA), Ischemic Stroke, Middle Cerebral Artery (MCA) Occlusion, M2 Segment Occlusion, Aphasia.

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INTRODUCTION

Chronic subdural hemorrhage (CSDH) is a common neurosurgical condition; however, ischemic cerebrovascular accident (CVA) following surgery for CSDH is relatively rare. The co-occurrence of CSDH with brain infarction, either incidentally or with a prior history, has been reported in 4% to 18% of cases [1–3]. While large vessel occlusion remains the most recognized cause of ischemic CVA, there is growing recognition of medium vessel occlusion as an important contributor. Recent studies suggest that the incidence of M2 segment occlusions may reach up to 7 per 10,000 people annually, with an estimated 21,176 cases per year in the United States [4]. Patients with untreated M2 occlusions often experience moderate to severe disability

at discharge, yet there remains ongoing debate regarding the optimal management strategy for medium vessel disease: medical therapy versus endovascular intervention [5].

CASE DETAILS

An 87-year-old male presented with sudden-onset right-sided weakness and aphasia noted on the morning of admission. His National Institutes of Health Stroke Scale (NIHSS) score at presentation was 11, and his baseline modified Rankin Scale (mRS) score was 2. The patient arrived within 1.5 hours of symptom onset. His medical history included type 2 diabetes mellitus, hypertension, atrial fibrillation, permanent pacemaker implantation, and bilateral chronic subdural hematomas, which had been surgically evacuated two weeks earlier.

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He had been taking apixaban for atrial fibrillation, which was discontinued following the diagnosis of bilateral subdural hematomas. On examination, his Glasgow Coma Scale (GCS) score was E4V1M6. Tone was reduced in the right upper and lower limbs, with power graded 3/5 on the right side. Mild residual weakness persisted in the left upper and lower limbs, and a right extensor plantar response was elicited. A non-contrast CT brain showed bilateral subacute subdural haematomas with a left middle cerebral artery (MCA) territory acute infarct (Figures 1 and 2). CT angiography revealed a complete cut-off in the M2 segment of the left MCA superior division (Figure 3), with markedly reduced opacification of the arteries supplying the left frontoparietal lobe, consistent with a thrombotic or thromboembolic occlusion and acute infarction in that region.

Routine blood investigations were within normal limits: haemoglobin 11.5 g/dL, INR 1.2, and normal renal, liver, and electrolyte profiles. Given his clinical presentation, imaging findings, and risk-benefit profile, the patient was taken up for mechanical thrombectomy under general anaesthesia. Vascular

access was obtained via the right femoral artery using an 8 Fr short sheath. An initial angiographic image was taken to visualise the occlusion (Figure 4). A 6 Fr CereBase DA catheter was positioned in the left MCA, confirming M2 occlusion. Red 62 and Red 43 aspiration catheters were advanced to the thrombus (Figure 5), and aspiration was performed, achieving TICI 3 reperfusion (Figure 6). Post-procedure, the patient had a challenging recovery. He underwent close monitoring, with follow-up CT scans at 24 hours, 7 days, and 1 month, showing gradual improvement. During his inpatient stay, he developed a lower respiratory tract infection, which was managed appropriately with antibiotics. With supportive care and rehabilitation, his condition improved gradually. By discharge, his speech had noticeably improved, he was mobilizing with assistance, and he was receiving enteral nutrition via a Ryle's tube. At 3-month follow-up, the patient was able to eat independently, ambulate with a walker, and perform most activities of daily living with minimal support. Serial CT scans demonstrated gradual resolution of the subdural hematomas without recurrence or further bleeding. Oral anticoagulation was restarted one month post-thrombectomy.

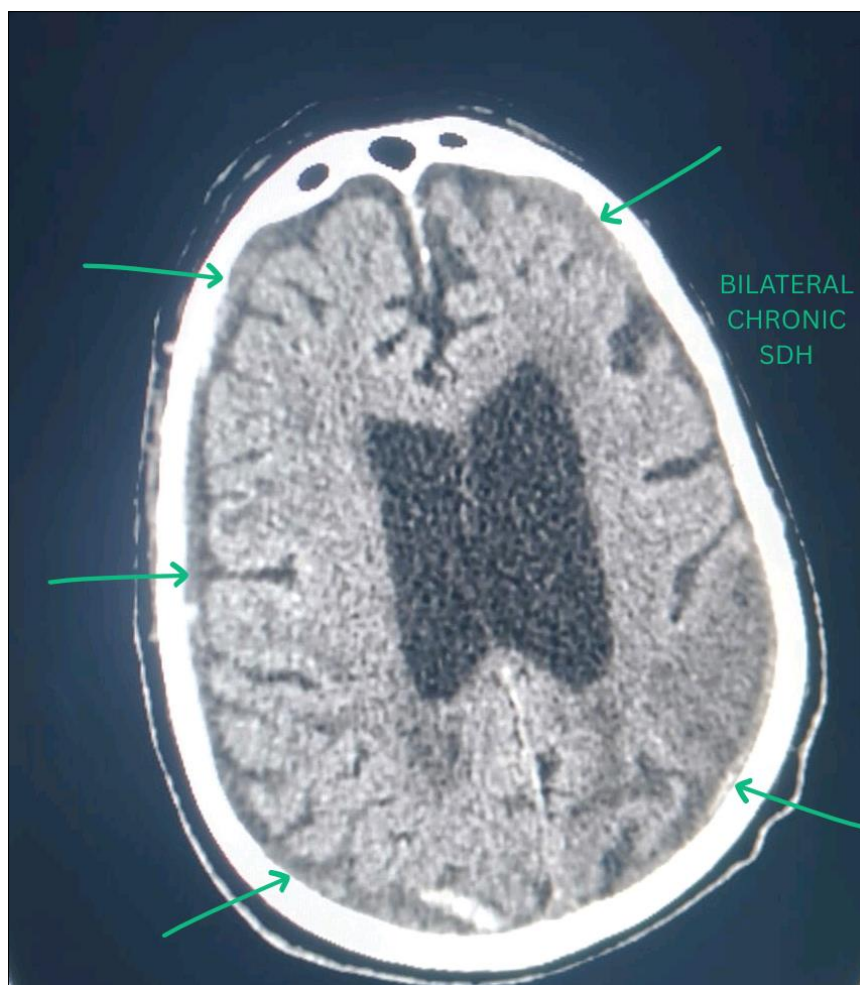


Fig. 1: Initial CT scan image showing bilateral chronic SDH

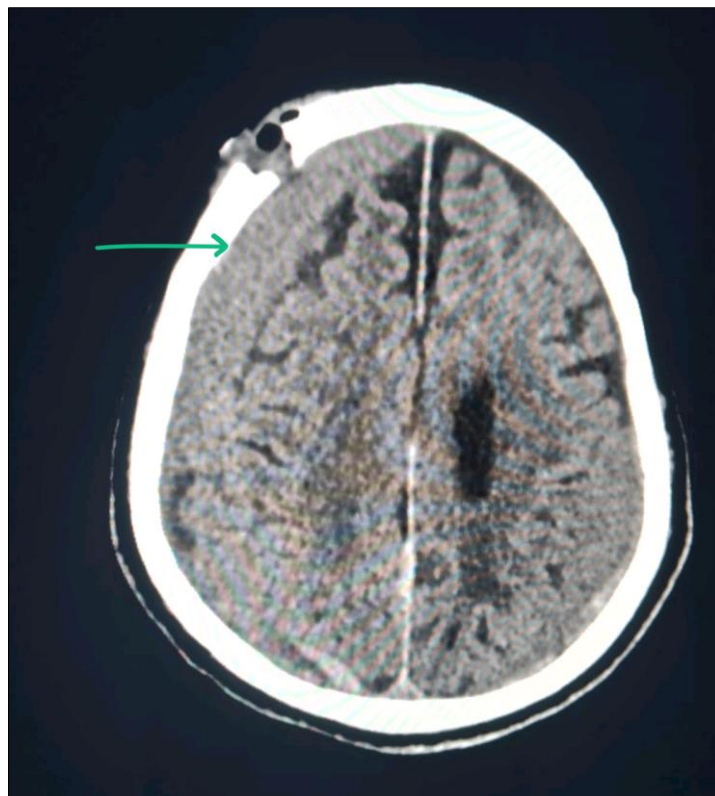


Fig. 2: CT scan image showing chronic SDH

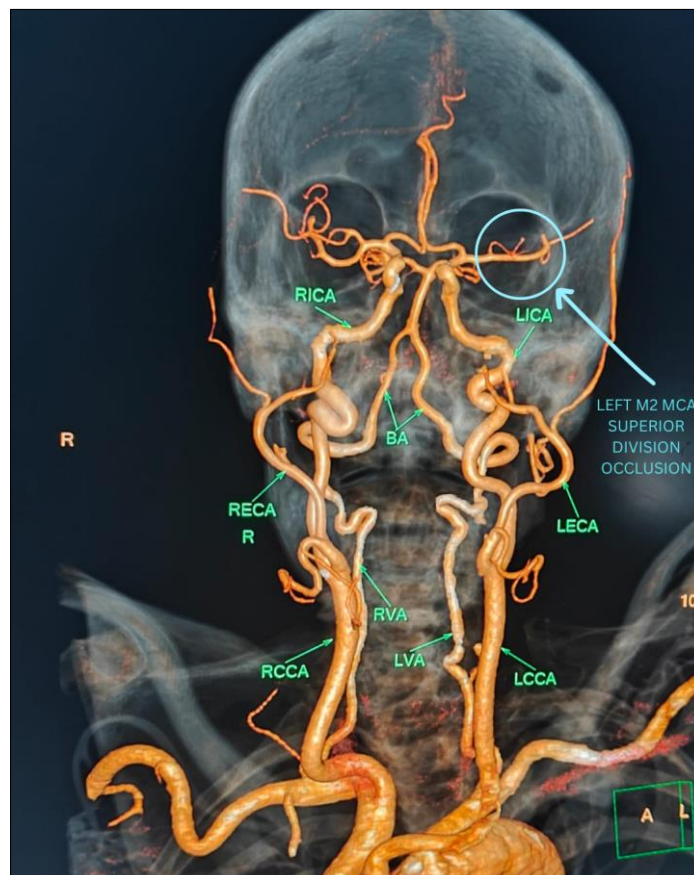


Fig. 3: CT Angiography image showing cut-off in the superior segment of Left M2 MCA due to the thrombus

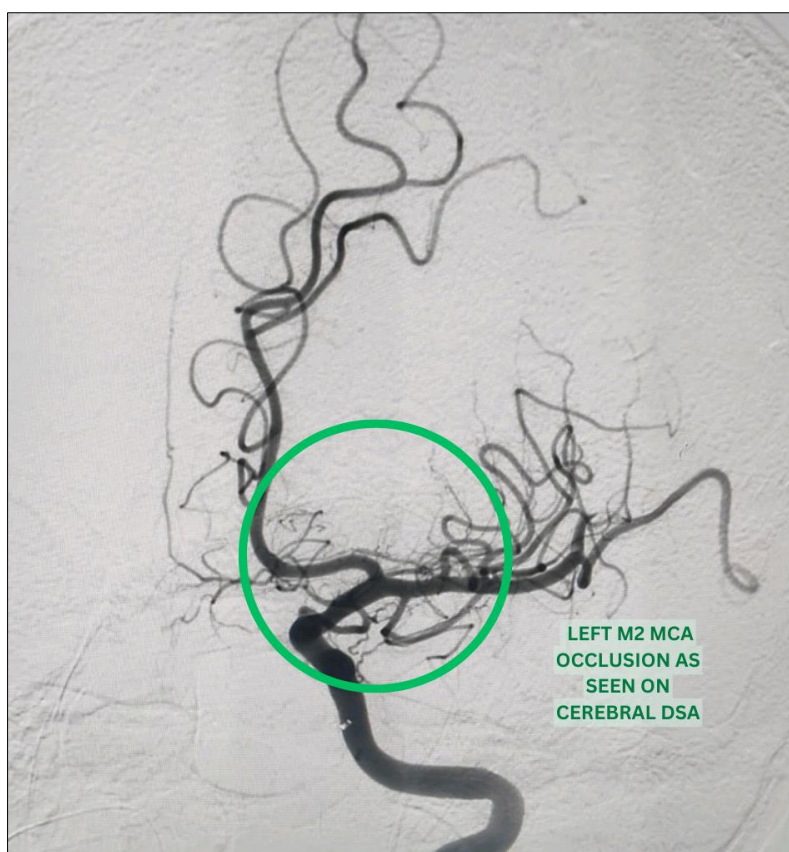


Fig. 4: Cut-off in the superior segment of Left M2 MCA due to the thrombus as seen on cerebral DSA

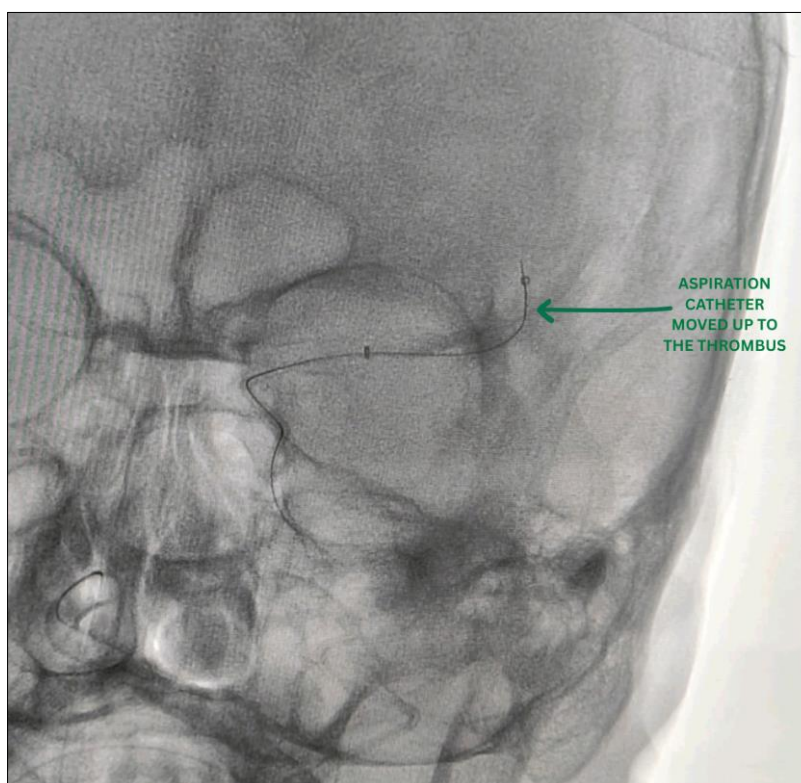


Fig. 5: Aspiration catheter moved up to the thrombus with guidewire

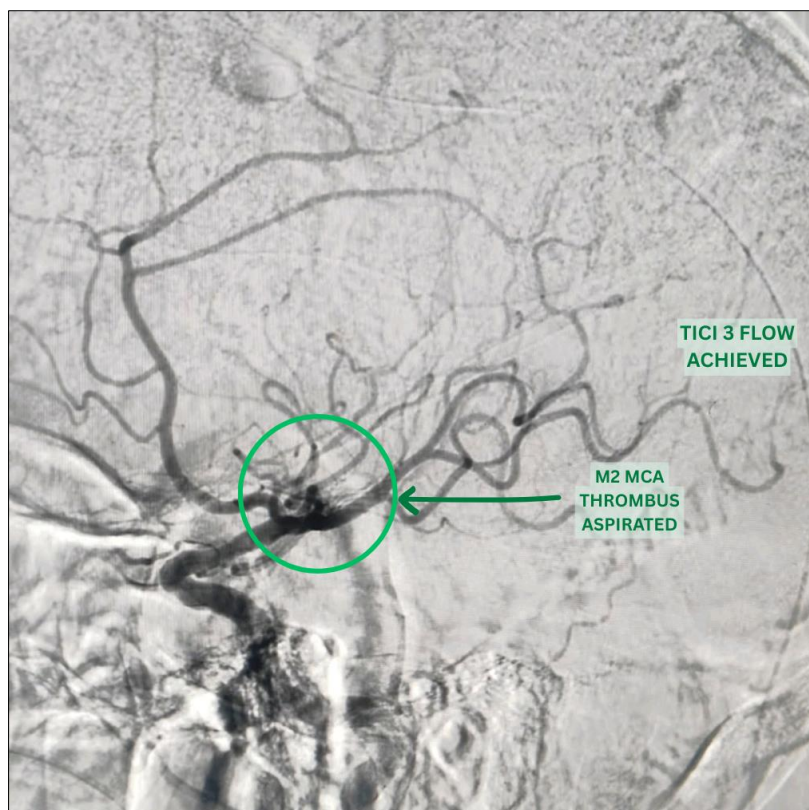


Fig. 6: M2 MCA thrombus aspirated and TICI 3 flow achieved

DISCUSSION

CSDH and subsequent ischemic CVA in the perioperative period present a critical therapeutic challenge, particularly when the patient has compelling indications for oral anticoagulation. We report the case of an 87-year-old male with atrial fibrillation who developed an acute, severely disabling ischemic stroke, specifically a medium vessel occlusion (MeVO) of the M2 segment of the left MCA, just two weeks after the surgical evacuation of bilateral CSDH, during the obligatory cessation of apixaban. While the co-occurrence of CSDH and CVA is known, this case is novel due to the successful and safe application of mechanical thrombectomy for a distal MeVO in a recently post-neurosurgical patient with persistent, resolving hematomas. This scenario highlights the difficulty in choosing treatment for MeVOs, where the benefit of endovascular therapy must be weighed against the procedural risk, especially in an elderly patient with heightened hemorrhagic risk from recent surgery. Ultimately, the successful achievement of TICI 3 reperfusion led to a favourable functional outcome and allowed for the timely re-initiation of OAC, demonstrating a positive approach with successful reperfusion can limit stroke size and allow early re-initiation of OAC, thereby preventing further events. Approximately one-third of acute ischemic strokes with an identifiable vessel occlusion are attributed to medium vessel occlusions (MeVOs), which represent non-large vessel occlusions that may be amenable to endovascular treatment (EVT). Overall, MeVOs involving medium-sized intracranial arteries account for 25% to 40% of all

acute ischemic strokes [6]. Medium vessel occlusions (MeVOs) are defined as occlusions involving the M2/M3, A2/A3, or P2/P3 arterial segments [7]. These occlusions typically present with more variable and less severe symptoms at baseline, often resulting in smaller infarcts and milder neurological deficits under current best medical management. However, this is not always the case, as the degree of disability depends greatly on the functional importance of the affected brain region. In our patient, the resulting disability was significant, manifesting as dysarthria and right-sided weakness. The anatomical component of the definition indicates the technical complexity of endovascular access, while the clinical component reflects the nature and severity of the resulting neurological deficits. Treating medium vessel occlusions (MeVOs) is challenging, especially when selecting the appropriate treatment. Physicians must balance potential benefits against procedural risks. Physicians must balance potential benefits against procedural risks, as the generally milder presentation of MeVOs can suggest a smaller EVT benefit compared to the higher procedural risk. Treatment decisions should consider the extent of the patient's deficit and whether the MeVO site fully explains the clinical symptoms. Mechanical thrombectomy is a safe and effective standard treatment for proximal middle cerebral artery (MCA) occlusions. However, thrombectomy in the M2 divisions of the MCA is technically demanding due to vessel tortuosity, increased risk of vessel injury, and potential for subarachnoid hemorrhage (SAH) [8]. However, it can serve as a potent treatment option. With recent advancements in catheter technology, retriever

devices, and growing neuroendovascular expertise, treatment of medium vessel occlusions (MeVOs) is emerging as a promising area in endovascular management of acute ischaemic stroke. In a study by Sarraj *et al.*, [9], patients undergoing mechanical thrombectomy had a 3.1-fold higher likelihood of achieving favourable outcomes compared with those receiving standard medical therapy with intravenous tissue plasminogen activator (IV tPA). Similarly, Charan *et al.*, reported a higher rate of successful recanalization in M2 occlusions (73.3%) compared with combined internal carotid artery (ICA), middle cerebral artery (MCA), and basilar artery thrombectomies (64%) [8]. There are contrasting views regarding the use of endovascular treatment (EVT) in medium vessel occlusions (MeVOs). Nevertheless, EVT is widely practiced, and several studies have demonstrated favourable outcomes. Considering this evidence, we proceeded with EVT in our patient to reduce disability and improve quality of life despite his underlying comorbidities and recent CSDH. The likely source of the thrombus is of cardioembolic origin given the atrial fibrillation and oral anticoagulant cessation. The underlying pathophysiology of CSDH involves chronic inflammation and neomembrane formation, which is inherently pro-angiogenic and fibrinolytic, contributing to continuous bleeding. However, the crucial decision to temporarily cease oral anticoagulation for CSDH evacuation creates a significant window of vulnerability, and recent studies demonstrate that the risk for postoperative thromboembolic complications (like the observed stroke) is notably high in patients with AF undergoing this procedure, underscoring a complex interplay between the inflammatory state of CSDH and the temporary pro-thrombotic state induced by OAC cessation [10]. A critical aspect of this case is the timing of the ischemic event. Our patient suffered a stroke two weeks after CSDH evacuation, precisely during the period of mandated OAC cessation for surgery. The need to interrupt OAC (apixaban, in this instance) for neurosurgical procedures, especially in patients with atrial fibrillation (AF), is known to elevate the risk of thromboembolic events significantly. Literature suggests that the highest risk of ischemic stroke after discontinuing OAC for surgery occurs within the first two weeks, peaking typically around seven days, as the protective effect of the medication wanes while the hypercoagulable state post-surgery persists [11]. Given the patient's advanced age, high CHA₂DS₂-VASc score, and the acute pro-thrombotic state induced by OAC withdrawal combined with recent neurosurgery, the occurrence of the MeVO stroke at this juncture underscores the extreme vulnerability of this patient population and validates the difficulty of managing competing bleeding and thrombotic risks. The management of anticoagulation in this patient with high-risk AF following acute intracranial hemorrhage constitutes the most critical clinical debate. The "Apixaban Gap," referring to the two-week interval between CSDH evacuation and the stroke, reflects

adherence to standard neurosurgical practice, where delaying the restart of oral anticoagulants (OACs) for 7 to 14 days post-craniotomy is typically mandated to minimize the risk of hemorrhagic recurrence, which can be devastating [12]. However, this required delay directly exposed the patient to maximum thromboembolic risk, highlighting the systemic lack of consensus and high-level evidence for managing OAC reversal and re-initiation after non-traumatic intracranial bleeding. The ultimate decision to successfully restart apixaban one month after the endovascular thrombectomy (EVT) procedure was a pragmatic and necessary step. This strategic re-anticoagulation acknowledged the successful resolution of the acute neurosurgical and interventional risks, effectively prioritizing long-term, guideline-directed management for the patient's high-risk chronic AF, which is essential for future stroke prevention. The management of M2 segment occlusions (MVO) remains a point of clinical controversy, particularly regarding the relative benefit of mechanical thrombectomy (MT) versus best medical management. While some retrospective studies suggest caution, compelling recent literature supports the utility of endovascular intervention for M2 lesions, especially in high-risk clinical scenarios [13]. In this 87-year-old patient, the decision to proceed with aggressive MT was strongly justified by several compounding factors. Despite the advanced age and the significant comorbidity of recent neurosurgery, the patient presented with a high NIHSS score of 11 and an exceptionally short time-to-treatment (1.5 hours from symptom onset to groin puncture). This combination of severe neurological deficit and ultra-early presentation mandated immediate aggressive reperfusion therapy. The technical achievement of TICI 3 reperfusion—the best possible outcome—provided the complete revascularization necessary for robust tissue salvage, directly contributing to the patient's excellent functional recovery (mRS 0 at 90 days). This outcome highlights that advanced age and comorbidities should not preclude timely MT in patients presenting with high stroke severity and short ischemic times.

CONCLUSION

This case encapsulates a critical neurosurgical and neurovascular dilemma, illustrating how rapid diagnosis and aggressive, successful endovascular intervention can lead to a favourable functional outcome despite the convergence of major hemorrhagic and thrombotic risks. Successful mechanical thrombectomy for this proximal M2 occlusion was likely the pivotal factor in achieving functional independence for this elderly patient, a finding consistent with systematic reviews suggesting that advanced age is not an independent contraindication to intervention when favourable premorbid status and rapid workflow are maintained [14]. Furthermore, the dilemma faced in resuming OAC after hemorrhagic complications, particularly in patients with high-risk atrial fibrillation, remains an area of clinical debate. While there is a trend

toward resuming OAC in AF patients post-ICH to minimize future ischemic events, the optimal timing is highly variable, emphasizing the need for robust, individualized, and multidisciplinary risk assessment [15]. Ultimately, this case powerfully affirms that age and recent neurosurgical history should not be absolute contraindications to life-saving acute ischemic stroke therapies like MVO thrombectomy, provided stringent patient selection and rapid treatment protocols are strictly adhered to.

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