

Acute posterior circulation stroke during chimney-endovascular aneurysm repair successfully treated with posterior cerebral artery thrombaspiration: A case report

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ABSTRACT

Intraoperative stroke is a rare but devastating complication during endovascular aneurysm repair (EVAR). We report a case of acute posterior cerebral artery thrombosis during chimney EVAR successfully managed with endovascular thrombaspiration. This case highlights the importance of immediate recognition and neurointerventional response to achieve favorable neurological outcomes. A 70-year-old man underwent urgent chimney EVAR for a ruptured abdominal aortic aneurysm. Shortly after completion of the procedure, the patient developed acute neurological symptoms. Emergency cerebral angiography revealed basilar and posterior cerebral artery thrombosis. Selective thrombaspiration via left vertebral artery access using Penumbra ACE 68 successfully restored flow. The patient fully regained consciousness after the intervention. Prompt recognition and immediate neurointerventional management of acute stroke during EVAR can lead to favorable outcomes. This case highlights the importance of a multidisciplinary approach and endovascular preparedness in hybrid operating room settings. (J Vasc Surg Cases Innov Tech 2025;11:101944.)

Keywords: EVAR; Chimney technique; Posterior cerebral artery; Ischemic stroke; Thrombaspiration; Endovascular repair; Hybrid OR; Case report

Abdominal aortic aneurysm (AAA) repair has evolved with the advent of endovascular aneurysm repair (EVAR), including adjunctive techniques such as chimney EVAR (ChEVAR) for complex anatomies.^{1,2} Although generally safe, EVAR may rarely precipitate ischemic stroke, especially in the presence of extensive atheroma or prolonged manipulations.³ Posterior circulation stroke during EVAR is exceptionally uncommon.⁴ Here, we present a case of basilar/posterior cerebral artery (PCA) stroke during ChEVAR with successful thrombaspiration.

CASE REPORT

A 70-year-old man presented with abdominal pain and hypotension. Computed tomography angiography revealed an infrarenal AAA approximately 8 cm in diameter with signs suggestive of contained rupture. The patient was evaluated by a multidisciplinary vascular team upon admission. Open surgical repair was considered but ultimately not pursued owing to the emergent nature of presentation and high predicted

perioperative risk. A formal preoperative risk assessment using institutional protocols and established risk models (including Vascular Quality Initiative and Society for Thoracic Surgery calculators) estimated a combined in-hospital morbidity and mortality risk of more than 40%, largely attributable to hemodynamic instability, advanced cardiac dysfunction (New York Heart Association functional class III), significant pulmonary comorbidities related to long-term smoking, mild chronic kidney impairment, and an overall American Society of Anesthesiologists physical status classification of IV.^{5,6}

Fenestrated grafts were not used owing to the emergent setting and anatomical constraints. Custom-made devices were not feasible owing to manufacturing delay, and physician-modified grafts were not considered appropriate owing to anatomical complexity, time-critical presentation, and institutional limitations. ChEVAR was thus selected as the most practical and safe solution. Systemic heparinization was achieved with an initial 10,000 units of unfractionated heparin, and that activated clotting time was monitored throughout (335 seconds after heparin, 322 seconds mid procedure, and 290 seconds at completion).

Under local anesthesia, bilateral femoral and bilateral brachial percutaneous access were obtained. The right femoral artery was used for main stent graft delivery, and the left femoral artery for contralateral limb extension and completion angiography. Both femoral sites were closed with Perclose ProGlide devices. Brachial access allowed deployment of chimney stents. Following initial aortography, two balloon-expandable stent grafts (iCover 5 × 37 mm on the right and Radiant 6 × 38 mm on the left) were first positioned in the renal arteries as chimney grafts to ensure renal perfusion. After careful positioning of

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Fig 1. Deployment of the main aortic endograft.



Fig 2. Vertebral angiography showing thrombotic occlusion of bilateral posterior cerebral arteries (PCAs).



Fig 3. Macroscopic view of the retrieved thrombus from the posterior cerebral artery (PCA) segment.



Fig 4. Final cerebral angiography demonstrating full reperfusion of the posterior circulation.

these chimney stents, a MicroPort Minos aortic stent graft was progressively deployed (Fig 1). Simultaneous balloon molding was performed to optimize sealing and reduce the risk of gutter-related endoleak. Final angiography confirmed accurate device positioning, patent renal stents, and no evidence of endoleak.

Neurological symptoms, including dizziness, slurred speech, and decreased consciousness, developed immediately after the removal of the last EVAR introducer, leading to an urgent decision to initiate cerebral intervention. The neurointerventional procedure was performed promptly in the same angiography suite by a

multidisciplinary endovascular team, including a neurointerventionalist and interventional cardiologists experienced in acute stroke care, allowing for a seamless transition from aortic to neurovascular management. Because both femoral access sites had been closed with ProGlide, the left femoral artery—previously used for a smaller sheath—was re-accessed for cerebral angiography and intervention to minimize vascular trauma. Right

vertebral artery injection showed hypoperfusion in the basilar trunk and bilateral posterior cerebral arteries. Left vertebral injection confirmed thrombotic occlusion of the PCA with impaired contrast filling (Fig 2). Using left vertebral artery access (dominant), a Penumbra ACE 68 aspiration catheter was advanced over a Whisper MS 0.014" wire to the PCA bifurcation. Manual thrombaspiration was performed with retrieval of dark red thrombus material (Fig 3). Final angiography demonstrated full reperfusion of the posterior circulation (Thrombolysis in Cerebral Infarction scale grade III) and no procedural complications (Fig 4).

Protamine reversal was not administered per protocol to avoid stent thrombosis. Postprocedurally, the patient's renal function remained stable (baseline creatinine 1.0 mg/dL; peak 1.2 mg/dL on day 2; return to baseline before discharge). He was transferred to the intensive care unit in stable condition, where he regained consciousness within 1 hour and was extubated. A postoperative brain CT was performed 24 hours after the intervention to exclude hemorrhagic transformation and confirmed no new ischemic or hemorrhagic lesions. Dual antiplatelet therapy with aspirin and clopidogrel was initiated thereafter. He was later discharged without significant neurological deficit. A follow-up imaging study (brain magnetic resonance imaging or computed tomography angiography) is planned at 6 months post discharge. In accordance with current recommendations,⁷ dual antiplatelet therapy was continued for 3 months and then transitioned to single-agent therapy (aspirin). Written informed consent was obtained from the patient for publication of this case report and accompanying images.

DISCUSSION

Acute ischemic stroke during EVAR is an exceptionally rare but severe complication, particularly when involving the posterior circulation.⁸ Although most intraoperative strokes during aortic interventions involve the anterior circulation, PCA territory infarctions are reported much less commonly.^{4,9}

In this case, upper extremity access for chimney stents—particularly via the brachial arteries—may increase the risk of embolic stroke owing to direct catheter and sheath manipulation across the aortic arch, even in the absence of overt aortic arch atheroma (shaggy aorta). This mechanism has been implicated in catheter-related cerebral embolism during endovascular procedures.¹⁰ Emergent presentation, hemodynamic instability, and procedural complexity further increased this risk. Formal preoperative risk assessment confirmed high perioperative risk for open repair, favoring an endovascular strategy.^{5,6}

Immediate recognition of neurological deterioration and prompt neurointerventional management were critical. Successful aspiration thrombectomy via vertebral access underscores the importance of hybrid team preparedness during complex EVAR procedures.^{11,12} Although posterior circulation thrombectomy is an established therapy in acute stroke, its emergent application intraoperatively

during EVAR has been documented only rarely. We were unable to identify any previous reports of endoarterial cerebral thromboaspiration after posterior circulation strokes temporally associated with EVAR; this case is the first to be reported of successful PCA thrombaspiration performed immediately after ChEVAR for a contained ruptured AAA.

Postprocedural antithrombotic management posed a significant challenge in this case, considering the recent contained rupture and the use of renal chimney stents. The choice of dual antiplatelet therapy was guided primarily by the need to maintain patency of the chimney stents and to prevent thrombotic events in the aortic endograft. Although anticoagulation reversal was avoided intraoperatively to reduce thrombotic risk, dual antiplatelet therapy initiation was delayed until postprocedural brain imaging confirmed the absence of hemorrhagic complications. This strategy aligns with contemporary recommendations for complex endovascular cases requiring simultaneous management of aortic and neurovascular pathologies.⁷ The patient's stable renal function supports the feasibility and safety of complex endovascular and neurointerventional combinations in select high-risk patients.

CONCLUSIONS

Acute posterior circulation stroke during EVAR is a rare but treatable emergency. Success depends on rapid diagnosis, immediate intervention, and a coordinated multidisciplinary team. This case supports the incorporation of neurointerventional capability in vascular centers performing high-risk EVAR procedures and emphasizes the need for perioperative cerebrovascular readiness in complex endovascular operations.

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DISCLOSURES

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REFERENCES

1. Becquemin JP, Pillet JC, Lescalie F, Sapoval M, Goueffic Y, Lermusiaux P. A multicenter comparison of endovascular aneurysm repair vs open surgery for abdominal aortic aneurysm treatment in low- and high-risk patients. *J Vasc Surg*. 2011;53:1167–1173. <https://doi.org/10.1016/j.jvs.2010.10.123>
2. Juszkat R, Gürke L, Bonvini R, Lachat M, Pfammatter T, Veith F. Chimney and periscope grafts in endovascular aortic repair: technique and results. *Cardiovasc Intervent Radiol*. 2013;36:593–602. <https://doi.org/10.1007/s00270-012-0502-x>
3. Aboyans V, Ricco JB, Bartelink MEL, Björck M, Brodmann M, Cohnert T. 2023 ESC guidelines on the diagnosis and treatment of aortic diseases. *Eur Heart J*. 2023;44:3661–3763. <https://doi.org/10.1093/eurheartj/ehad156>
4. Katsanos AH, Malhotra K, Goyal N, Arthur AS, Mokin M, Khatri P. Endovascular treatment for basilar artery occlusion: a meta-analysis. *Neurology*. 2021;96:e880–e891. <https://doi.org/10.1212/WNL.0000000000011222>
5. Wanhainen A, Powell JT, Verzini F, van Herzele I. Editor's choice — ESVS 2024 clinical practice guidelines on the management of abdominal aorto-iliac artery aneurysms. *Eur J Vasc Endovasc Surg*. 2024;67:1–124. <https://doi.org/10.1016/j.ejvs.2023.10.014>

6. Ono S, Itoga NK, Beck AW, Rockman CB, Nolan BW, Goodney PP. Evaluation of the Vascular Quality Initiative (VQI) cardiac risk index for prediction of myocardial infarction after vascular surgery. *J Vasc Surg*. 2018;68:1422–1431. <https://doi.org/10.1016/j.jvs.2018.03.412>
7. Bown MJ, Boyle JR, Jones L, Badger S, Khashram M, Loftus IM. Antithrombotic strategies after endovascular aneurysm repair: evidence summary and recommendations. *Eur J Vasc Endovasc Surg*. 2020;59:729–738. <https://doi.org/10.1016/j.ejvs.2020.01.023>
8. Brott TC, Halperin JL, Abbara S, Bacharach JM, Barr JD, Bush RL. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the management of patients with extracranial carotid and vertebral artery disease. *Circulation*. 2011;124:e54–e130. <https://doi.org/10.1161/CIR.0b013e31820d8c98>
9. Jäger HR, Brown MM, Clifton A, Fearn S, Rudd JHF, Lee R. Current endovascular techniques for acute ischemic stroke: advances and challenges. *Lancet Neurol*. 2022;21:387–400. [https://doi.org/10.1016/S1474-4422\(22\)00062-9](https://doi.org/10.1016/S1474-4422(22)00062-9)
10. Kwon H, Kim JS, Ko YG, Kang TS, Choi D, Jang Y. Atheroembolic cerebral infarction associated with catheter-based procedures: mechanisms and prevention. *J Stroke*. 2014;16:144–150. <https://doi.org/10.5853/jos.2014.16.3.144>
11. Mokin M, Ansari SA, McTaggart RA, Bulsara KR, Fraser JF, Grossberg JA. Indications and technique for endovascular treatment of posterior circulation strokes: a scientific statement from the Society of NeuroInterventional Surgery. *J Neurointerv Surg*. 2020;12:676–684. <https://doi.org/10.1136/neurintsurg-2020-016240>
12. Saver JL, Goyal M, Bonafe A, Diener HC, Levy EI, Pereira VM. Time to treatment with endovascular thrombectomy and outcomes: a meta-analysis. *JAMA*. 2024;331:119–131. <https://doi.org/10.1001/jama.2023.20768>

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