

Case report

Very Early Treatment of Recurrent Strokes with Mechanical Thrombectomy in a Patient with Severe Anemia

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Abstract

Introduction: Recurrent ischemic strokes requiring repeated mechanical thrombectomy (MT) within 24 hours of the initial event are uncommon. This case report describes a 61-year-old woman who underwent two MTs 6 hours apart for ischemic strokes associated with severe anemia due to pure red cell aplasia (PRCA) in different vascular territories.

Case Presentation: The patient, with a history of PRCA presented with left-sided hemiparesis and facial paresis. Neuroimaging revealed a right middle cerebral artery (MCA) M1 segment occlusion. She underwent MT with complete recanalization. Four hours later, new neurological symptoms emerged due to a left MCA occlusion, and a second MT was performed successfully.

Management and Outcome: Alongside MTs, the patient received supportive care, including blood transfusions, analgesics, and anticoagulants. Her neurological status improved significantly two weeks upon discharge with residual left-sided weakness and facial paresis. At 90 days, the patient was able to walk, indicating further functional improvement.

Discussion: This case is notable for the short interval between two MTs and the patient's underlying hematological condition. Severe anemia and PRCA likely contributed to hypercoagulability and increased stroke risk. Despite these unusual risk factors, the patient's outcome was favorable, which is consistent with the effectiveness of repeated MT for early recurrent ischemic strokes.

Conclusion: Early recurrent stroke in different vascular territories, particularly in the context of hematological disorders, is rare but can be managed effectively with timely MT. Further research is needed to evaluate stroke recurrence risk and therapeutic responses in patients with hematological conditions, including PRCA and severe anemia.

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Introduction

Although nearly one quarter of all ischemic strokes develop in patients with a prior history of stroke (1), repeated treatment with mechanical thrombectomy (MT) within the first 24 hours from the initial presentation is uncommon. This paper presents a rare case of repeated MT performed only 6 hours after the first endovascular treatment in a patient with severe anemia, which was the result of pure red cell aplasia (PRCA), a rare disorder characterized by a reduction or absence of red blood cell precursors in the bone marrow.

Case presentation

A 61-year-old female presented to the emergency department with left-sided hemiparesis and left-sided facial paresis which was visible when she woke up. A detailed time-flow chart of patient's symptom onset, imaging and treatment provided is seen in Illustration 1.

Her past medical history included severe anemia with pure red cell aplasia (PRCA) treated with blood transfusions and a degenerative disc disease with lumbar radiculopathy and subsequent paraparetic gait (modified Rankin scale [mRS] score 2).

On admission, the patient's hemoglobin level was 90 g/L, with an erythrocyte count of $3.01 \times 10^{12}/L$ and a hematocrit of 0.264 L/L. The platelet count was $179 \times 10^9/L$. Coagulation studies showed an INR of 0.94 and a fibrinogen level of 3.3 g/L. The thrombin time was 15.8 seconds, and the activated partial thromboplastin time ratio was 0.85. She was previously hospitalized in the intensive care unit 4 years ago due to respiratory insufficiency, pulmonary abscess and sepsis. She had no previous medical history of hypertension, diabetes or stroke.

Upon examination, the patient was conscious and oriented, afebrile and euglycemic. Her blood pressure and heart rate as well as electrocardiogram were normal.

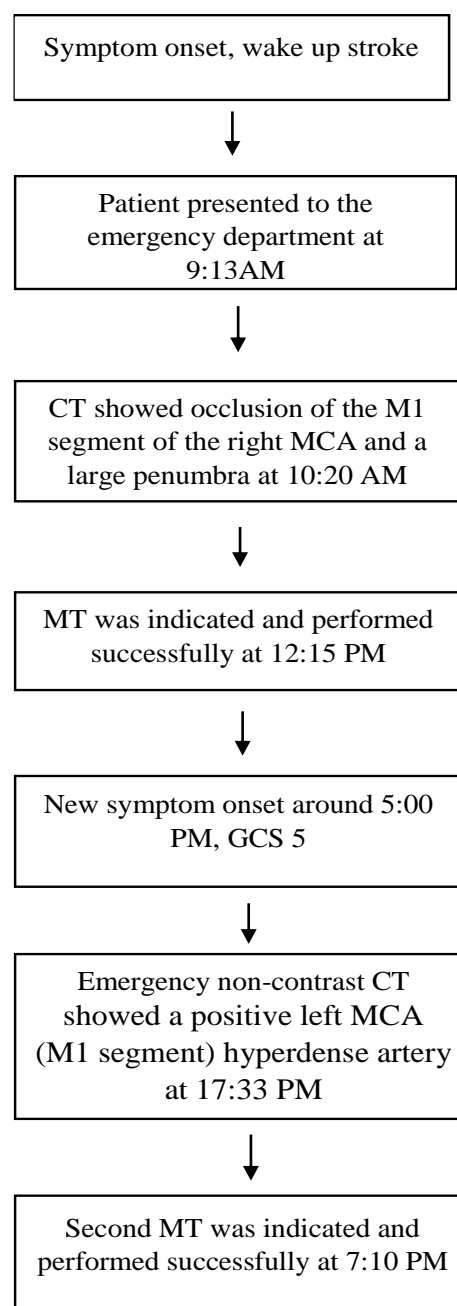


Illustration 1: Detailed time-flow chart since the patient's symptom onset. The patient presented at 9:13 AM with a wake-up stroke. Computed tomography (CT) at 10:20 AM showed right MCA (middle cerebral artery) M1 segment occlusion with a large penumbra; Mechanical thrombectomy (MT) was successfully performed at 12:15 PM. At 5:00 PM, the patient deteriorated [GCS (Glasgow Coma Scale) 5]. CT at 5:33 PM revealed a left MCA (M1) hyperdense artery, and a second MT was indicated and successfully performed at 7:10 PM.

The patient had right-sided gaze deviation, with left-sided supranuclear facial paresis, dysarthria, dysphagia, left-sided hemiplegia and incontinence. Myotatic reflexes were diminished on the left side and the Babinski reflex was positive bilaterally. She had hemihypoesthesia and left-sided visual-sensory neglect without anosognosia. The National Institutes of Health Stroke Scale (NIHSS) score was 12.

Non-contrast computed tomography (CT) revealed hypodensity of the head of the caudate on the right side, consistent with ischemia (Alberta Stroke Program Early CT Score [ASPECTS] of 9) and the positive hyperdense right middle cerebral artery (MCA) sign. CT angiography (CTA) confirmed occlusion of the

M1 segment of the right MCA with good collateral flow (collateral score of 2).

CT perfusion confirmed a large penumbra and mechanical thrombectomy was indicated. The procedure was performed in conscious sedation with one-pass complete recanalization (modified Thrombolysis in Cerebral Infarction [mTICI] score 3) 3 hours after admission to the hospital, using contact aspiration and stent-retriever (Figure 1a and 1b). The patient was transferred to the stroke unit. Partial symptom improvement was noted, with a NIHSS score of 9.



Figure 1a: Digital subtraction angiography before mechanical thrombectomy shows a contrast filling defect of the right middle cerebral artery (arrow), indicating thrombotic occlusion.

Figure 1b: Angiography after mechanical thrombectomy shows complete recanalization of the right middle cerebral artery.

Four hours after the mechanical thrombectomy, the patient became somnolent and subfebrile (37.6 degrees Celsius). Left-sided head deviation with right-sided gaze palsy, sensorimotor aphasia, aphagia and right hemiplegia were noted and a NIHSS score of 27. The patient rapidly progressed to coma, Glasgow coma scale (GCS) of 5, intubated and mechanically ventilated. Emergency non-contrast CT did not show newly demarcated hypodensities but showed a positive left MCA (M1 segment) hyperdense artery. Mechanical thrombectomy in general anesthesia was indicated, with a common femoral artery puncture two hours after the onset of new symptoms. One pass recanalization with contact aspiration was achieved with the mTICI score of 3 (Figure 2a and 2b), with a puncture-to-recanalization time of 35 minutes. The patient was transferred back to the Stroke Unit.



Figure 2a: Digital subtraction angiography before mechanical thrombectomy shows a contrast filling defect of the left middle cerebral artery (arrow), indicating thrombotic occlusion.

Figure 2b: Angiography after mechanical thrombectomy shows complete recanalization of the left middle cerebral artery.

NIHSS was 17 (1 and 8 hours after the second recanalization) and 7 (16 and 24 hours after the second recanalization).

The CT control 24 hours after the second thrombectomy showed bilateral hypodensities in basal ganglia, representing zones of ischemia, with no signs of cerebral oedema or hemorrhagic transformation. During the hospital stay, the patient was treated with red blood cell concentrates, crystalloid fluids, low molecular weight heparin, analgesics, antipyretics and folic acid.

She was discharged to rehabilitation 2 weeks after the stroke with only left-sided facial paresis, and hemiparesis, and an NIHSS score of 7. After 90 days, the patient was able to walk, and the mRS was 2.

Upon discharge, the patient was in hematologic treatment by symptomatic red blood cells transfusions. Three years after the bilateral mechanical thrombectomy the patient's neurological status was unchanged, but the general condition was complicated with urosepsis and hemodynamic instability which resulted in severe hypotension and cardiac arrest.

Discussion

It is estimated that the incidence of recurrent stroke is between 1.2% and 9% (2), and the percentage of recurrent strokes in the total number of strokes is almost 25% per year (1). The highest risk of recurrence is within the first 90 days, with the cumulative rate in the first week after the initial ischemic incidence being estimated at 4.3% (3,4). Early recurrence further increases 90-day mortality to 31.8% in contrast to 2.9% mortality in patients who did not experience recurrent stroke during the first 30 days (5). The risk of recurrent stroke can be reduced with the fast initiation of dual antiplatelet therapy (6) which has led to a temporal decrease in recurrence over the years (7).

It has been shown that "small vessel disease" and hypertension are the leading risk factors associated with the late recurrence (8-10), while large artery atherosclerosis, carotid stenosis, systolic blood pressure, serum glucose, statin therapy and initial stroke treatment are all independently associated with the very early recurrence (9,11).

Repeated endovascular MT has been described in the literature for treating very early recurrent stroke. In a retrospective study by Bouslama et al., out of total 697 patients treated with MT, 15

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of them (2%) were treated with repeated MT with a median time interval between interventions of 18 (1-278) days (12). In the aforementioned study, nearly half (7 out of 15) had MT performed on the contralateral cerebral hemisphere, with the shortest time interval between two procedures being 3 days. In another study, 10 out of 200 patients had received repeated MT for acute ischemic stroke, 4 of them for different vascular territory, with a median interval between MTs being 6.7 days (13).

Retrospective analysis of a large nationwide registry in Netherlands showed that 0.7 % out of 3928 patients underwent a repeated endovascular procedure, in 70% of cases in the same hemisphere, with a median of 78 days between thrombectomies (14). A small percentage of repeated MTs compared to other studies have been attributed to the fact that only patients with anterior large vessel occlusions were included in the study.

To our knowledge, the patient presented in our case had among the shortest time intervals (6 hours) between two MTs in different vascular territories ever described in literature. We have found only one case report with a shorter time interval, where 3 hours after MT of the M2 segment of left MCA, another MT was performed due to thrombosis of the M1 segment of right MCA (15). Same site reocclusion is believed to be associated with vessel wall damage during the procedure, as well as intracranial and extracranial atherosclerotic stenosis of treated arteries (16). On the other hand, the explanation for different territory recurrent ischemic stroke is mainly cardioembolic events, which are the main cause for repeated MTs in 43% - 87% of cases across different studies (12, 14, 17, 18).

The patient presented in our case had no major risk factors for acute ischemic stroke development, such as hypertension, hyperlipidemia, diabetes, cardiac arrhythmias, smoking or even old age. However, she was severely anemic due to previously diagnosed pure red cell aplasia. Her past medical history,

which included pulmonary abscess and sepsis, also suggested immunodeficiency. As a part of her primary hematological disease, she had a coagulation disorder with the tendency of hypercoagulation. Also, she was physically inactive due to her degenerative spinal condition before suffering stroke. Physical inactivity is known to be a risk factor for all non-communicable diseases, including stroke. It also increases stroke severity and post-stroke disability (19).

Anemia is also considered to be a risk factor for the development of ischemic stroke and it increases post-stroke mortality (20). Anemia causes hyperdynamic circulation, which activates inflammatory response in vascular endothelial cells, resulting in thrombus formation. Furthermore, in iron-deficiency anemia, an increase in erythropoietin secretion can stimulate platelet formation and subsequent thrombocytosis and thrombosis. In a study by Chang et al., anemia was found to be a risk factor for ischemic stroke recurrence and composite vascular events (21).

A combination of these factors was the most likely cause of the case-study patient's recurrent strokes, as the remaining diagnostic workup did not identify any other potential causes of hypercoagulability or embolic stroke. This case highlights the importance of considering hematological laboratory findings in the evaluation of acute ischemic stroke, especially in patients with no usual risk factors.

Conclusion

Very early recurrent stroke in a different vessel can be uncommon presentation of severe anemia and might implicate an underlying hematological or coagulation disorder. Endovascular mechanical thrombectomy is a safe and effective treatment option in very early recurrent stroke caused by large vessel occlusion.

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Disclosure

References

1. Mohan KM, Wolfe CDA, Rudd AG, Heuschmann PU, Kolominsky-Rabas PL, Grieve AP. Risk and cumulative risk of stroke recurrence: a systematic review and meta-analysis. *Stroke*. 2011;42(5):1489-1494.
2. Sandercock P, Tangkanakul C. Very Early Prevention of Stroke Recurrence. *Cerebrovasc Dis*. 1997;7(Suppl. 1):10-15.
3. Hillen T, Coshall C, Tilling K, Rudd AG, McGovern R, Wolfe CDA. Cause of Stroke Recurrence Is Multifactorial. *Stroke*. 2003;34(6):1457-1463.
4. Grau AJ, Weimar C, Buggle F, Heinrich A, Goertler M, Neumaier S, Glahn J, Brandt T, Hacke W, Diener HC. Risk factors, outcome, and treatment in subtypes of ischemic stroke: the German stroke data bank. *Stroke*. 2001 Nov;32(11):2559-66.
5. Moroney JT, Bagiella E, Paik MC, Sacco RL, Desmond DW. Risk Factors for Early Recurrence After Ischemic Stroke. *Stroke*. 1998;29(10):2118-2124.
6. Johnston SC, Easton JD, Farrant M, Barsan W, Conwit RA, Elm JJ, Kim AS, Lindblad AS, Palesch YY; Clinical Research Collaboration, Neurological Emergencies Treatment Trials Network, and the POINT Investigators. Clopidogrel and Aspirin in Acute Ischemic Stroke and High-Risk TIA. *N Engl J Med*. 2018 Jul 19;379(3):215-225.
7. Lee M, Wu YL, Ovbiagele B. Trends in Incident and Recurrent Rates of First-Ever Ischemic Stroke in Taiwan between 2000 and 2011. *J Stroke*. 2016;18(1):60-65.
8. Fuster V. Epidemic of cardiovascular disease and stroke: the three main challenges. Presented at the 71st scientific sessions of the American Heart Association. Dallas, Texas. *Circulation*. 1999;99(9):1132-1137.
9. Elnady HM, Mohammed GF, Elhewag HK, Mohamed MK, Borai A. Risk factors for early and late recurrent ischemic strokes. *Egypt J Neurol Psychiatry Neurosurg*. 2020;56(1):56.
10. Leoo T, Lindgren A, Petersson J, von Arbin M. Risk factors and treatment at recurrent stroke onset: results from the Recurrent Stroke Quality and Epidemiology (RESQUE) Study. *Cerebrovasc Dis Basel Switz*. 2008;25(3):254-260.
11. Bourand N, Brorson JR. Predictors of very early stroke recurrence in the POINT trial population. *BMC Neurol*. 2022;22(1):177.
12. Bouslama M, Haussen DC, Rebello LC, Grossberg JA, Frankel MR, Nogueira RG. Repeated Mechanical Thrombectomy in Recurrent Large Vessel Occlusion Acute Ischemic Stroke. *Interv Neurol*. 2017;6(1-2):1-7.
13. Hsueh SJ, Chen CH, Yeh SJ, Lin YH, Tsai LK, Lee CW, Tang SC, Jeng JS. Early recurrence of ischemic stroke in patients receiving endovascular thrombectomy. *J Formos Med Assoc*. 2021 Feb;120(2):854-862.
14. Pirson FAV, van Oostenbrugge RJ, van Zwam WH, Remmers MJM, Dippel DWJ, van Es ACGM, van den Wijngaard IR, Schonewille WJ, Staals J. Repeated Endovascular Thrombectomy in Patients With Acute Ischemic Stroke: Results From a Nationwide Multicenter Database. *Stroke*. 2020 Feb;51(2):526-532.
15. Rossi SS, Iaccarino G, Alessiani M, Bonura A, Bravi MC, Crupi D, De Fino C, Mangiardi M, Pezzella FM, Testani E, Fabiano S, De Rubeis G, Anticoli S. Repeated mechanical thrombectomy in recurrent ischemic stroke due to large vessel occlusion: A case report and literature review. *J Clin Images Med Case Rep*. 2023.

16. Marto JP, Strambo D, Hajdu SD, Eskandari A, Nannoni S, Sirimarco G, Bartolini B, Puccinelli F, Maeder P, Saliou G, Michel P. Twenty-Four-Hour Reocclusion After Successful Mechanical Thrombectomy. *Stroke*. 2019;50(10):2960-2963.
17. Weber R, Stracke P, Chapot R. Time Point, Etiology, and Short-Term Outcome of Repeated Mechanical Thrombectomy Due to Recurrent Large Vessel Occlusion. *Front Neurol*. 2019;10.
18. Bhogal P, AlMatter M, Hellstern V, Pérez MA, Ganslandt O, Bänzner H, Henkes H. Mechanical thrombectomy for recurrent large vessel occlusion. *J Clin Neurosci*. 2019 Aug;66:107-112.
19. Susts J, Reinholdsson M, Sunnerhagen KS, Abzhandadze T. Physical inactivity before stroke is associated with dependency in basic activities of daily living 3 months after stroke. *Front Neurol*. 2023;14:1094232.
20. Heo J, Youk TM, Seo KD. Anemia Is a Risk Factor for the Development of Ischemic Stroke and Post-Stroke Mortality. *J Clin Med*. 2021;10(12):2556.
21. Chang JY, Lee JS, Kim BJ, Kim JT, Lee J, Cha JK, Kim DH, Cho YJ, Hong KS, Lee SJ, Park JM, Lee BC, Oh MS, Kim DE, Lee KB, Park TH, Choi JC, Shin DI, Kim WJ, Sohn SI, Bae HJ, Han MK. Influence of Hemoglobin Concentration on Stroke Recurrence and Composite Vascular Events. *Stroke*. 2020;51(4):1309-1312.

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Vrlo rano liječenje ponovljenih moždanih udara mehaničkom trombektomijom kod pacijentice s teškom anemijom

Sažetak

Uvod: Ponovljeni ishemijski moždani udari koji zahtijevaju ponavljanje mehaničke trombektomije (MT) unutar 24 sata od početnog incidenta nisu uobičajeni. Ovaj prikaz opisuje slučaj 61-godišnje žene koja je podvrgnuta MT-u u dva navrata u razmaku od šest sati zbog ishemijskih moždanih udara s pridruženom teškom anemijom, uslijed čiste aplazije crvenih krvnih zrnaca (PRCA) na različitim vaskularnim područjima.

Anamneza: Pacijentica je imala povijest PRCA-e s hemiparezom lijeve strane i facijalnom parezom. Neuroimaging je otkrio okluziju M1 segmenta desne srednje cerebralne arterije (SCA). Podvrgnuta je MT-u uz potpunu rekanalizaciju. Četiri sata kasnije pojavili su se novi neurološki simptomi uslijed okluzije M1 segmenta lijeve moždane arterije i drugi MT uspješno je proveden.

Terapija i ishod: Uz MT, pacijentica je primila podržavajuću skrb, uključujući transfuzije krvi, analgeziju i antikoagulanse. Njezin neurološki status znatno se poboljšao dva tjedna po otpustu s rezidualnom slabošću lijeve strane i facijalnom parezom. Nakon 90 dana pacijentica je mogla hodati, pokazujući daljnje funkcionalno poboljšanje.

Rasprava: Slučaj je istaknut zbog kratkog razmaka između dva MT-a i postojećeg hematološkog stanja u anamnezi pacijentice. Izgledno je da su teška anemija i PRCA pridonijeli hiperkoagulabilnosti i povećanom riziku od moždanog udara. Unatoč tim neuobičajenim čimbenicima rizika, ishod pacijentice bio je dobar, što se povezuje s učinkovitošću ponovljenoga MT-a za rano ponovljene ishemijske moždane udare.

Zaključak: Rano ponovljen moždani udar u drugom vaskularnom području, pogotovo u kontekstu postojećih hematoloških poremećaja, rijedak je, ali može se uspješno liječiti pravovremenim MT-om. Potrebna su daljnja istraživanja kako bi se procijenio rizik od ponavljanja moždanog udara i odgovori na terapiju kod pacijenata s hematološkim stanjem, uključujući PRCA-u i tešku anemiju.