

Alteplase for acute ischemic stroke after recent total hip arthroplasty

Katarina Dakay*; Jacob Didion; Thomas Germano; Michael Reznik; Daniel C Sacchetti

*Katarina Dakay

Department of Neurology, Warren Alpert Medical School of Brown University, USA

Phone: 914-493-8795; Email: katarina.dakay@gmail.com

Abstract

Background: Acute ischemic stroke is a potentially debilitating complication of total hip arthroplasty. Alteplase and mechanical thrombectomy are the only acute methods of reperfusion therapy available for acute ischemic stroke; however, thrombectomy is only feasible in patients with a large vessel occlusion and major recent surgery is considered a contraindication to alteplase due to the risk of peri-operative hemorrhage. In patients with severe deficits, however, it may be appropriate to consider alteplase if the risk of hemorrhage is acceptable.

Case Report: We describe a case of a gentleman in his seventies who presented with acute onset global aphasia and right hemiparesis five days after a total hip arthroplasty. His CT angiogram demonstrated no hemorrhage and no large vessel occlusion. Due to the severe deficits, he was given alteplase. The patient's neurologic symptoms resolved over hours and MRI brain showed stroke; he developed a hematoma of the hip that required drainage to rule out abscess but did not require transfusion or surgery. He was discharged to rehabilitation five days after presentation.

Conclusion: In patients with severe neurologic deficits post-operatively after total hip arthroplasty, alteplase may help improve neurologic recovery, although the risk of operative site hemorrhage must be considered.

Keywords

alteplase; thrombolysis; perioperative stroke; acute ischemic stroke; total hip arthroplasty

Abbreviations

CT: Computerized tomography; THA: Total hip arthroplasty; NIHSS: National institutes of health stroke scale; MRI: Magnetic resonance imaging; AHA: American heart association

Introduction

Acute ischemic stroke in the postoperative patient is a potentially devastating condition and also a clinical treatment dilemma. Alteplase is currently the standard of care for acute ischemic stroke, however, in patients who have recently undergone major surgery, surgical site or systemic hemorrhage is a serious concern. We describe a patient who had recently undergone total hip arthroplasty and received alteplase for acute ischemic stroke.

Case Report

A 72 year old gentleman with a history of coronary artery disease, hypertension, and recent total hip arthroplasty (THA) presented with sudden onset right hemiparesis and aphasia beginning two hours prior to arrival. Computerized tomography (CT) brain with CT angiogram demonstrated no hemorrhage and no large vessel occlusion; NIHSS was 22 points. He underwent a THA for a femoral neck fracture five days prior to presentation but no other contraindications to alteplase.

The risks of postoperative systemic hemorrhage were weighed with the risk of severe neurologic disability and discussed with the patient's wife, who agreed with alteplase administration. The patient rapidly improved and returned to his pre-stroke baseline within hours. However, he subsequently developed erythema and edema of the right hip and a fever to 102 F. Hemoglobin decreased from 10.5 g/dL to 9.5 g/dL but remained stable thereafter without requiring blood transfusion. He was started on broad-spectrum antibiotics due to concern for hematoma superinfection; orthopedics recommended CT of his hip which demonstrated multiloculated fluid collections suggestive of hematoma versus abscess (Figure 1a). Interventional radiology drained the fluid collection; final cultures were negative and antibiotics were narrowed to treat cellulitis.

Magnetic resonance imaging (MRI) of the brain showed an embolic-appearing stroke involving the left occipital and parietal lobes, and left anteromedial thalamus (Figure 1b). Echocardiogram was unremarkable and in hospital telemetry was negative for atrial fibrillation. Ultrasound of his leg was negative for venous clot. His stroke mechanism was deemed to be embolic stroke of unknown source; an outpatient cardiac monitor was pursued. He was started on aspirin and a statin and discharged to rehabilitation.

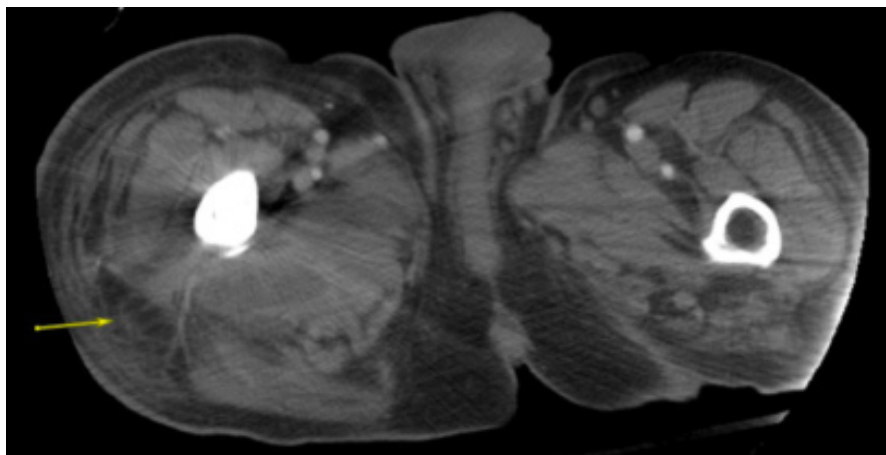


Figure 1a: demonstrates multiloculated fluid collection in the hip suggestive of hematoma

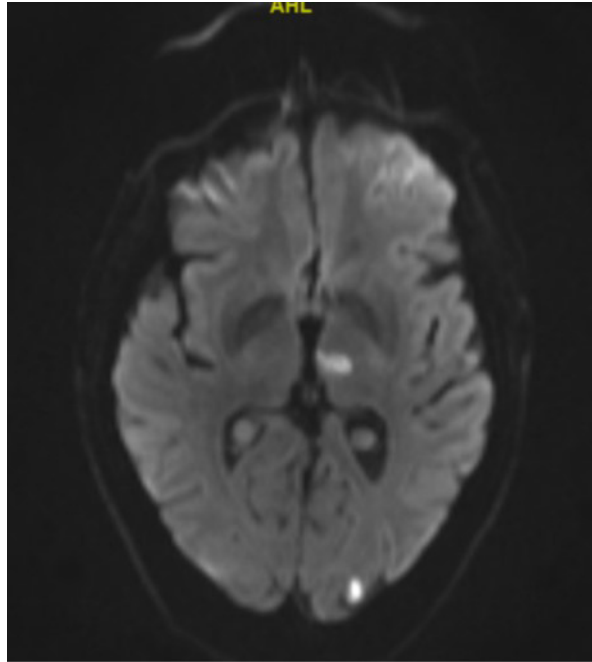


Figure 1b: of MRI brain shows the left thalamic and occipital lobe strokes

Discussions

Acute ischemic stroke is an uncommon but potentially debilitating complication of THA occurring in 0.11-0.2% of patients [1] with the median time to onset of symptoms occurring eight days post-surgery [2]. Patients who have undergone a THA are at a 4.7-fold increased risk of ischemic stroke during the first two weeks after their surgery [3]; those who have a prior history of stroke or who are undergoing repair of a hip fracture rather than elective surgery are at the highest risk [4].

In the postoperative phase, coagulation factors are altered, with a spike in prothrombin occurring during bone preparation and a fall in endogenous tissue plasminogen activator; D dimer was also found to rise during the first several days after surgery [5]. These alterations may lead to a higher risk of stroke in the post-operative setting, in combination with other factors such as withholding of antiplatelet or anticoagulation prior to procedure as well as immobility after surgery.

Presently, there are two acute reperfusion therapies available for acute ischemic stroke; alteplase is recommended for eligible patients who present within 4.5 hours of their last known normal and lack contraindications, and mechanical thrombectomy is recommended for patients with a large vessel occlusion who meet appropriate clinical and imaging criteria. Only a subset of patients have a large vessel occlusion; in the case of our patient, there was no large vessel occlusion and so alteplase was the only available acute reperfusion treatment.

The most feared complication of alteplase is either intracranial or systemic hemorrhage, and the previous American Heart Association (AHA) guidelines from 2013 list major surgery within 14 days as a relative exclusion criteria for alteplase [6]. However, withholding alteplase in the setting of severe stroke can lead to permanent neurologic disability. The dilemma of whether to administer alteplase in the postoperative setting is commonly encountered. Most published data is from the cardiac surgery setting, in which

intra-arterial local fibrinolysis has been reported to be efficacious in small case series without significant bleed-ing risk [7] but has been associated with hemothorax and symptomatic anemia in others [8]. The risk of systemic alteplase may be more significant, though will likely vary depending on the type of surgery and the amount of time elapsed; published data is sparse, however. Aside from our patient, there is one previous published case report regarding alteplase in the post-operative setting after hip surgery. In that report, a patient developed a left middle cerebral artery occlusion with right hemiparesis and aphasia two days after a THA and was given alteplase with neurologic improvement, but developed a hematoma requiring blood transfusion [9]. As with our patient, the hematoma was managed conservatively and did not cause any life-threatening hemodynamic compromise. The most recent AHA guidelines have been revised to state that the risk of neurologic disability should be balanced with the risk of postoperative hemorrhage in patients who have undergone recent major surgery and present with acute ischemic stroke [10].

Considerations for using alteplase in the postoperative setting to treat acute ischemic stroke should include weighing symptom severity and potential disability to the patient, as well as surgical considerations such as the nature and location of the operation, the time elapsed since the procedure, any preexistent postoperative bleeding, and the ability to manage hematoma formation at the surgical site. Intracranial or spinal surgery within three months, for example, is considered an exclusion on the FDA label, and is considered to be potentially harmful in the AHA guidelines [10]. Additionally, it may be prudent to type and screen the patient prior to alteplase administration in the event that blood products should become necessary [9]. The presence of a large vessel occlusion may also influence the decision to administer or forego alteplase administration, as these patients may be able to be treated with thrombectomy alone given the heightened risk of hemorrhage with systemic fibrinolysis.

Conclusion

In patients who have undergone a recent joint arthroplasty, alteplase may be reasonably tolerated and effectively mitigate the neurological disability from acute ischemic stroke, although the risk of hemorrhage should be carefully weighed.

References

1. Bateman BT, Schumacher HC, Wang S, Shaefi S, Berman MF. Perioperative acute ischemic stroke in noncardiac and nonvascular surgery: Incidence, risk factors, and outcomes. *Anesthesiology*. 2009; 110: 231-238.
2. Petersen PB, Kehlet H, Jorgensen CC, Lundbeck Foundation Center for Fast-Track H, Knee Re-placement Collaborative G. Incidence and risk factors for stroke in fast-track hip and knee arthroplasty-a clinical registry study of 24,862 procedures. *J Arthroplasty*. 2019; 34:743-749 e742
3. Lalmohamed A, Vestergaard P, Cooper C, de Boer A, Leufkens HG, van Staa TP, et al. Timing of stroke in patients undergoing total hip replacement and matched controls: A nationwide cohort study. *Stroke*. 2012; 43: 3225-3229.
4. Popa AS, Rabinstein AA, Huddleston PM, Larson DR, Gullerud RE, Huddleston JM. Predictors of ischemic stroke after hip operation: A population-based study. *J Hosp Med*. 2009; 4: 298-303.
5. Dahl OE, Pedersen T, Kierulf P, Westvik AB, Lund P, Arnesen H, et al. Sequential intrapulmonary and systemic activation of coagulation and fibrinolysis during and after total hip replacement surgery. *Thromb Res*. 1993; 70: 451-458.
6. Jauch EC, Saver JL, Adams HP, Jr, Bruno A, Connors JJ, Demaerschalk BM, et al. Guidelines for the early management of patients

with acute ischemic stroke: A guideline for healthcare professionals from the american heart association/american stroke association. *Stroke*. 2013; 44: 870-947.

7. Katzan IL, Masaryk TJ, Furlan AJ, Sila CA, Perl J, 2nd, Andrefsky JC, et al. Intra-arterial thrombolysis for perioperative stroke after open heart surgery. *Neurology*. 1999; 52: 1081-1084.

8. Moazami N, Smedira NG, McCarthy PM, Katzan I, Sila CA, Lytle BW, et al. Safety and efficacy of intraarterial thrombolysis for perioperative stroke after cardiac operation. *Ann Thorac Surg*. 2001; 72: 1933-1937; discussion 1937-1939

9. Ezzet KA. Reversal of acute ischemic stroke after tha using tissue plasminogen activator. *Orthopedics*. 2013; 36: e676-678.

10. Demaerschalk BM, Kleindorfer DO, Adeoye OM, Demchuk AM, Fugate JE, Grotta JC, et al. Scientific rationale for the inclusion and exclusion criteria for intravenous alteplase in acute ischemic stroke: A statement for healthcare professionals from the american heart association/american stroke association. *Stroke*. 2016; 47: 581-641.

Manuscript Information: Received: July 12, 2019; Accepted: October 07, 2019; Published: October 15, 2019

Authors Information: Katarina Dakay^{1*}; Jacob Didion¹; Thomas Germano²; Michael Reznik^{1,3}; Daniel C Sacchetti¹

¹Department of Neurology, Warren Alpert Medical School of Brown University

²Department of Emergency Medicine, Warren Alpert Medical School of Brown University

³Department of Neurosurgery, Warren Alpert Medical School of Brown University

Citation: Dakay K, Didion J, Germano T, Reznik M, Sacchetti DC. Alteplase for acute ischemic stroke after recent total hip arthroplasty. *Open J Clin Med Case Rep*. 2019; 1590.

Copy right statement: Content published in the journal follows Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>). © Dakay K 2019

About the Journal: Open Journal of Clinical and Medical Case Reports is an international, open access, peer reviewed Journal focusing exclusively on case reports covering all areas of clinical & medical sciences.

Visit the journal website at www.jclinmedcasereports.com

For reprints and other information, contact info@jclinmedcasereports.com