Published in final edited form as:

Neurocrit Care. 2019 April ; 30(2): 490–491. doi:10.1007/s12028-018-0646-1.

Thrombus “squeezing” through patent foramen ovale after traumatic brain injury

Kazuma Nakagawa, MD^{1,2} and Todd B. Seto, MD, MPH^{1,2}

¹The Queen’s Medical Center, Honolulu, HI

²Department of Medicine, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI

Keywords

Patent foramen ovale; trauma

Introduction:

Traumatic brain injury (TBI) independently increases the risk of venous thromboembolism (VTE)¹ from hypercoagulable state associated with acute trauma.² The risk of VTE is three- to four-fold higher with TBI compared to non-TBI trauma patients.³ However, a visual evidence of VTE and paradoxical embolism after TBI causing stroke in the acute setting has not been described.

Case:

A 23-year-old man was admitted after a motorcycle accident with Glasgow Coma Scale (GCS) of 6. Trauma-protocol imaging studies revealed traumatic subarachnoid hemorrhage, right femur fracture, left radial and ulnar fractures, right 1st and 2nd rib fractures, right lung contusion, and bilateral renal hematomas/lacerations. The focused assessment with sonography for trauma (FAST) exam was negative. To evaluate for myocardial contusion, transthoracic echocardiography (TTE) was ordered, which showed normal left and right ventricular function with estimated ejection fraction of 55% without evidence of myocardial contusion. Furthermore, a mobile density (10 mm × 5 mm) was seen adjacent to the interatrial septum. This was confirmed with transesophageal echocardiography (TEE) in the mid-esophageal bicaval view, which revealed a large mass near the fossa ovalis, likely reflecting a thrombus “squeezing” through patent foramen ovale (PFO) (Figure), with a thrombus on the right and left atrial side of the interatrial septum. No thrombus was

Corresponding Author: Kazuma Nakagawa, MD, Neuroscience Institute, The Queen’s Medical Center, 1301 Punchbowl Street, Honolulu, HI 96813, Phone: (808) 537-7152 / Fax: (808) 547-4001, kazuma.nakagawa@hawaii.edu.

Author Contributions

Dr. Nakagawa contributed to the study concept and design, analysis and interpretation, critical revision of the manuscript for important intellectual content. Dr. Seto contributed to acquisition of data, analysis and interpretation, critical revision of the manuscript for important intellectual content and study supervision.

Conflict of Interest: none

Disclosure

Dr. Nakagawa reports no disclosure.

Dr. Seto reports no disclosure.

visualized in the left atrial appendage. Duplex ultrasonography of the upper and lower extremities revealed a superficial venous thrombosis of the right cephalic vein but no deep venous thrombosis. Coagulation studies were unremarkable. Anticoagulation therapy was initiated; however, he developed acute right middle cerebral artery infarction. No other clinical manifestation of systemic thromboembolism was noted. Differential diagnosis for the source of thrombus in this case includes early VTE not detected on duplex ultrasonography, early central venous catheter-associated thrombosis, atrial thrombus formation after blunt chest trauma with thrombus migration, and underlying hypercoagulable disorder.

Acknowledgments

Funding

Funding information is not required for the manuscript.

REFERENCES

1. Denson K, Morgan D, Cunningham R, et al. Incidence of venous thromboembolism in patients with traumatic brain injury. *Am J Surg* 2007;193:380–383; discussion 383–384. [PubMed: 17320539]
2. Engelman DT, Gabram SG, Allen L, Ens GE, Jacobs LM. Hypercoagulability following multiple trauma. *World J Surg* 1996;20:5–10. [PubMed: 8588412]
3. Reiff DA, Haricharan RN, Bullington NM, Griffin RL, McGwin G, Jr., Rue LW, 3rd. Traumatic brain injury is associated with the development of deep vein thrombosis independent of pharmacological prophylaxis. *J Trauma* 2009;66:1436–1440. [PubMed: 19430251]

Figure: A thrombus “Squeezing” through a Patent Foramen Ovale

Two-dimensional transesophageal echocardiography (mid-esophageal bicaval view) revealed a large (10 mm × 5 mm) mass on the right atrial side of the interatrial septum near the fossa ovalis, with a density on the adjacent left atrial side, likely reflecting a thrombus in transit that is “squeezing” through a patent foramen ovale (arrow).