Head injury while on anticoagulation

Small numbers, big risks

Katherine I. Nearing, MD; Jack W. Tsao, MD, DPhil, FAAN

Treatment of mild traumatic brain injury (mTBI)/concussion is usually handled by emergency medicine and primary care physicians or the injured person might not seek medical care. When a patient is evaluated, imaging may not be required if the neurologic examination is normal. However, if there are focal neurologic deficits, vomiting, headache, coagulopathy, age >60 years, outward evidence of head or neck trauma, intoxication, or a dangerous mechanism of trauma, then head CT or brain MRI is recommended. In situations where a patient has an initially negative head CT without any residual signs or symptoms, discharge from the emergency department (ED) is considered safe. However, this is not the case for patients on anticoagulation—immediate discharge from ED after a normal head CT may not be appropriate.¹ Traumatic brain injury (TBI) affects more than 1.7 million Americans yearly, and the proportion of Americans on anticoagulation is increasing (prescriptions at outpatient visits are up 38% from 2009 to 2014), so that more physicians are being faced with this dilemma without much literature to guide them.^{2,3} Due to unknown rates of delayed intracranial hemorrhage (ICH), providers typically err on the side of caution and allow for a prolonged period of observation and obtain repeat head imaging.

The utility of this practice is examined in this issue of *Neurology® Clinical Practice* by Campiglio et al.⁴ The authors retrospectively examine data in one center where the practice includes 48 hours of observation and a follow-up head CT. They found that among 284 patients on anticoagulation who had an initial CT that did not demonstrate hemorrhage, only 4 had hemorrhage on follow-up CT (1.4%), and not one of these was clinically significant. The article also points out that the cost for each hospitalization was approximately €654 in Europe and \$8,152 in the United States.

This study brings up the important point that it may not be financially prudent to observe all such patients and repeat scans. With a growing elderly population and a growing portion of them on anticoagulation, this is an extra expense our health care system could do without. It also informs clinical practice in that most patients on anticoagulation who have a fall from standing have a low likelihood of delayed ICH and lower likelihood of requiring neurosurgical intervention.

The authors conclude that it is safe to discharge mTBI patients on anticoagulation after a negative head CT. This study does not fully address that question for the following reasons. The number of participants is limited and the population is homogenous, composed mostly of patients who had falls rather than motor vehicle accidents or other traumas. Rates of hemorrhage as high as 6% have been reported within a 24-hour observation window in a small

See page 296

Department of Neurology (KIN, JWT), University of Tennessee Health Science Center; Department of Neurology (JWT), Memphis Veterans Affairs Medical Center; and Children's Foundation Research Institute (JWT), Le Bonheur Children's Hospital, Memphis, TN.

Funding information and disclosures are provided at the end of the editorial. Full disclosure form information provided by the authors is available with the **full text of this article at Neurology.org/cp.**

Correspondence to: knearing@uthsc.edu

prospective study that had a higher percentage of TBI due to trauma, with 2 patients presenting at 2 and 8 days with symptomatic subdural hematomas.⁵ This suggests that the follow-up length of 48 hours may not be long enough.

Other studies have suggested that there is a danger of significantly delayed ICH when the follow-up window is extended. In one study of 211 patients, 4 patients presented for readmission with symptomatic hemorrhage between 2 and 28 days after initial injury and evaluation.⁶ Another study that included patients on clopidogrel and warfarin had a longer follow-up window of 60 days and found readmissions for symptomatic hemorrhage up to 54 days.⁷ Underreporting is also possible, as death from such a complication would cause loss to follow-up. Different characteristics have been suggested as potential risk factors for these significantly delayed ICH presentations, such as international normalized ratio >3, mechanism of trauma, and patient age, but there is no consensus thus far.^{4,5,7,8} Another point made in multiple articles on this topic is that there is a false-negative rate of approximately 2% on head CT reports in the ED⁹ and some of the readmissions fell into this category.

We need more specific guidelines addressing subpopulations experiencing mTBI in order to decide length of observation, avoid unnecessary hospitalization, and relieve economic burden. This study informs that effort. The question that it provokes is equally important. What risk factors predict delayed ICH both as defined in this study and the significantly delayed ICH that occurs up to 2 months after discharge? An answer to this question would allow us to treat these high-risk patients more effectively, reversing coagulopathy immediately, and suspending anti-coagulation and even antiplatelet medications on a subset of patients.

REFERENCES

1. Jagoda AS, Bazarian JJ, Bruns JJ, et al. Clinical policy: neuroimaging and decisionmaking in adult mild traumatic brain injury in the acute setting. *Ann Emerg Med* 2008;52:714–748.
2. Barnes GD, Lucas E, Alexander GC, Goldberger ZD. National trends in ambulatory oral anticoagulant use. *Am J Med* 2015;128:1300–1305.
3. Faul M, Xu L, Wald MM, Coronado V. Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations, and Deaths, 2002–2006. Atlanta: CDC, National Center for Injury Prevention and Control; 2010.
4. Campiglio L, Bianchi F, Cattalini C, et al. Mild brain injury and anticoagulants: less is enough. *Neurol Clin Pract* 2017;7:296–305.
5. Menditto VG, Lucci M, Polonara S, Pomponio G, Gabrielli A. Management of minor head injury in patients receiving oral anticoagulant therapy: a prospective study of a 24-hour observation protocol. *Ann Emerg Med* 2012;59:451–455.
6. Schoonman GG, Bakker DP, Jellema K. Low risk of late intracranial complications in mild traumatic brain injury patients using oral anticoagulation after an initial normal brain computed tomography scan: education instead of hospitalization. *Eur J Neurol* 2014;21:1021–1025.
7. Swap C, Sidell M, Ogaz R, Sharp A. Risk of delayed intracerebral hemorrhage in anticoagulated patients after minor head trauma: the role of repeat cranial computed tomography. *Perm J* 2016;20:14–16.
8. Miller J, Lieberman L, Nahab B, et al. Delayed intracranial hemorrhage in the anticoagulated patient. *J Trauma Acute Care Surg* 2015;79:310–313.
9. Erly WK, Ashdown BC, Lucio RW, Carmody RF, Seeger JF, Alcala JN. Evaluation of emergency CT scans of the head: is there a community standard? *AJR Am J Roentgenol* 2003;180:1727–1730.

AUTHOR CONTRIBUTIONS

K. Nearing: drafting/revising the manuscript. J.W. Tsao: drafting/revising the manuscript, analysis or interpretation of data.

ACKNOWLEDGMENT

The authors thank Katherine Robinson-Freeman for editorial assistance.

STUDY FUNDING

No targeted funding reported.

DISCLOSURES

K. Nearing reports no disclosures. J.W. Tsao serves on the editorial board of *Neurology: Clinical Practice*; receives publishing royalties for *Traumatic Brain Injury: A Clinician's Guide to Diagnosis, Management, and Rehabilitation* (Springer, 2012) and *Teleneurology in Practice: A Comprehensive Clinical Guide* (Springer, 2015); and owns stock in Biogen and Illumina. Full disclosure form information provided by the author is available with the **full text of this article at Neurology.org/cp**.

CORRECTIONS

Pimavanserin: A novel therapeutic option for Parkinson disease psychosis

In the Review article “Pimavanserin: A novel therapeutic option for Parkinson disease psychosis” by T. Hawkins and B.D. Berman,¹ there are 2 minor errors. The last sentence in the third paragraph under “Development of pimavanserin” should have read “In addition, pimavanserin did not affect motor symptom severity and led to significant decreases in caregiver burden and improvements in nighttime sleep and daytime wakefulness.” The second-to-last sentence under “Prescribing information” should read “In the positive phase 3 trial of pimavanserin detailed above, there were 3 deaths; 2 in the treatment group and 1 in the placebo group.” The authors regret the errors.

REFERENCE

1. Hawkins T, Berman BD. Pimavanserin: A novel therapeutic option for Parkinson disease psychosis. *Neurol Clin Pract* 2017;7:157–162.

Acute hemichorea as unusual first multiple sclerosis presentation

In the article “Acute hemichorea as unusual first multiple sclerosis presentation” by G. Giovannini et al.¹, published ahead of print on July 22, 2016, there was an error in Video 1. An audio track should not have been included in the video. The revised video without the audio track was republished on June 27, 2017. The authors regret the error.

REFERENCE

1. Giovannini G, Cavallieri F, Meletti S, et al. Acute hemichorea as unusual first multiple sclerosis presentation. *Neurol Clin Pract* 2017;7:e9–e11.