High Risk Emergency Medicine

Minor Head Injuries in Patients on Oral Anticoagulants

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Case: Head injury

HPI: 67 yo m w/ PMH HTN, Gout, A-fib, on coumadin & beta blocker, BIBA – slipped and fell in the shower. Hit his head No LOC

PE: 130/45, P 63, R 16, 99% RA, T 36.0

General: NAD

HEENT: Abrasion and small hematoma to L temple, perrl, no dental trauma,

Neck: in cervical collar

Neuro: GCS 15, MAE x 4
INR 2.9

- Negative imaging – OK to discharge home?
Question:

What is the risk of delayed intracranial hemorrhage in patients taking oral anticoagulants with minor head injury?

• He’s on aspirin, not coumadin, does he need a second CTH?
• Second CTH for Clopidogrel (Plavix)?
• Ticagrelor (Brilinta)?
• Prasugrel (Effient)?

• Second CTH for rivaroxiban (Xarelto)?
• Dabigatran (Pradaxa)?
• Which patients with mild TBI should have a noncontrast head CT scan in the ED?
Pearl:

- Know your rules and what they’re powered to detect.
ACEP Clinical Policy

Clinical Policy: Neuroimaging and Decisionmaking in Adult Mild Traumatic Brain Injury in the Acute Setting


Mild TBI POCKET GUIDE
Guideline for Adult Patients
A part of CDC’s “Heads Up” Series
Consider CTH if:

Level B: Head trauma patients with no loss of consciousness or posttraumatic amnesia and one or more of the following:

- Focal neurologic deficit
- Vomiting
- Severe headache
- Age ≥ 65 years old
- Physical signs of a basilar skull fracture
- GCS score < 15
- Coagulopathy
- Dangerous mechanism of injury.*

*Dangerous mechanism of injury includes ejection from a motor vehicle, a pedestrian struck, and a fall from a height of > 3 feet or 5 steps.

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**Delayed Posttraumatic Acute Subdural Hematoma in Elderly Patients on Anticoagulation**

• Case series: 4 patients over 2 years

• Ages 65-86

• Aspirin and enoxaparin
• Coumadin, on chronic dialysis, INR 3
• Coumadin, INR 3
• Coumadin, INR 3.2

• All had CT#1 Normal
• All had delayed hemorrhage
• 3 required surgery
• 2 died
“We recommend that elderly, anticoagulated mild TBI patients should be admitted for 24 to 48 hours of observation after injury.”

“even a normal neurological exam and normal CT scan does not preclude subsequent rapid deterioration. “

Traumatic Brain Injury in Anticoagulated Patients
David B. Cohen, MD, Charles Rinker, MD, FACS, and Jack E. Wilberger, MD, FACS

J Trauma. 2006 Mar;60(3):553-7.
• Retrospective review of prospectively collected head injury database and a trauma registry
• 77 patients taking warfarin w/ GCS 13-15
• Avg age 68
• Avg INR 4.4
• 64% had CTH performed
• 12.5% abnormal

• 28 Patients DC’ed from the ED
• 10 (35%) had a normal CTH performed
• 18 returned to the ED, Dx’ed w/ significant ICH
• 2 died at home of SDH found on autopsy

• Among these 20 patients, mortality 88%
• 45 patients admitted for observation
• 4 had abnormalities on CTH
• Within 8-18 hours, 80% of these patients had a decline in GCS to <10
• Mortality 84%

• 12 patients presented to the ED in delayed fashion after their injury w/ neuro deficits.

• All had craniotomy
• Mortality 83%
• Overall mortality in these 77 anticoagulated patients with minor head injury 80.6%.

Advanced Age and Preinjury Warfarin Anticoagulation Increase the Risk of Mortality After Head Trauma

Jan Franko, MD, PhD, Karen J. Kish, MD, Brendan G. O’Connell, MD, Sujata Subramanian, MD, and James V. Yusheak, MD, FACS

• Retrospective analysis of 1493 blunt head injury patients
• 159 on warfarin

“warfarin anticoagulation is an independent predictor of mortality after blunt TBI. Warfarin anticoagulation carries a six-fold increase in TBI mortality.”

![Graph showing mortality and intracranial hemorrhage after head trauma](image)
Take-Home Message

• Higher INR $\Rightarrow$ higher risk for ICH and death

*Incidence and Predictors of Intracranial Hemorrhage After Minor Head Trauma in Patients Taking Anticoagulant and Antiplatelet Medication*

Edward S. Brewer, MD, Boris Reznikov, MD, Rebecca F. Liberman, MPH, Richard A. Baker, MD, Michael S. Rosenblatt, MD, Carlos A. David, MD, and Sebastian Flacker, MD, PhD

*J Trauma. 2011 Jan;70(1):E1-5*
3 year retrospective review of trauma registry
Minor head injury (GCS 13-15)
Taking Warfarin or Clopidogrel
141 patients met inclusion criteria
41 (29%) diagnosed with ICH
4 died

“Despite a presenting GCS score of 15, patients with minor head injury taking anticoagulation or antiplatelet therapy have a high incidence of intracranial hemorrhage.”
Delayed Intracranial Hemorrhage After Blunt Trauma: Are Patients on Preinjury Anticoagulants and Prescription Antiplatelet Agents at Risk?

Kimberly A. Peck, MD, C. Beth Sise, JD, RN, MSN, Steven R. Shackleford, MD, Michael J. Sise, MD, Richard Y. Calvo, MPH, Daniel I. Sack, BA, Sarah B. Walker, BA, and Mark S. Schechter, MD


- Retrospective review – blunt trauma on warfarin or antiplatelet therapy
- 424 patients had a negative CTH#1 performed
- 362 patients had CTH2 performed
• 4 patients (1%) had abnormal CTH#2

• None had declining neuro exams

• 3 discharged home

• 1 died of CV etiology

Question:

• What is the optimal management of traumatic intracranial hemorrhage in patients taking warfarin?
Rapid Warfarin Reversal in Anticoagulated Patients with Traumatic Intracranial Hemorrhage Reduces Hemorrhage Progression and Mortality

Felicia A. Ivascu, MD, Greg A. Howells, MD, Fredrick S. Junn, MD, Holly A. Bair, MSN, Phillip J. Bendick, PhD, and Randy J. Janczyk, MD

Trauma. 2005 Nov;59

PATIENT ON COUMADIN

Suspected or Confirmed Head Trauma

Immediate Evaluation by ECP
Immediate Head CT Scan
Type & Crossmatch
Thaw 2 units AB FFP

Positive Head CT
Transfuse 2 units AB FFP immediately
Transfuse additional 2 units type specific FFP immediately
Vitamin K IVPB
Stat Neurosurgery Evaluation

Negative Head CT
Admit for Observation
Results

• Small study
• Enrolled 82 patients on Coumadin with head trauma
• 19 had intracranial bleeding
• 10% (2) died

• Compare to pre-protocol mortality 48%

Conclusion

• Rapid confirmation of ICH with CT scan and reversal of coagulopathy decreases progression of ICH and reduces mortality.
Do you have a plan to handle these intracranial bleeds?

Warfarin Reversal

- FFP (4-6 units)
- Vitamin K (PO vs. IV)
- Prothrombin Complex Concentrate (PCC)
  - Bebulin – Factors 2, 7, 9, 10
  - Kcentra – Factors 2, 7, 9, 10, Proteins C & S
LMWH & Heparin

- Administer protamine

Dabigatran & Rivaroxaban

- Prothrombin Complex Concentrate (evidence for Rivaroxaban)
- Dialysis
- Charcoal
- Time
Antiplatelet agents

- On ASA/Plavix + ICH – give platelets

Baby Aspirin?
Secondary Intracranial Hemorrhage After Mild Head Injury in Patients With Low-Dose Acetylsalicylate Acid Prophylaxis

Mark Tauber, MD, Heiko Koller, MD, Philipp Moroder, MS, Wolfgang Hitzl, PhD, and Herbert Resch, MD

Level 1 trauma center

100 consecutive trauma patients > 65 on low dose ASA

4 cases of delayed hemorrhage on CT #2

1 fatal outcome, 1 required neurosurgery

Recommended 12-24 hour routine repeat CTH vs. 48 hr. observation admission

*J Trauma.* 2009 Sep;67(3):521-5

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Immediate and Delayed Traumatic Intracranial Hemorrhage in Patients With Head Trauma and Preinjury Warfarin or Clopidogrel Use

Daniel K. Nishijima, MD, MAS, Steven R. Offerman, MD, Dustin W. Ballard, MD, David R. Vinson, MD, Uli K. Chettipally, MD, MPH, Adina S. Rauchwerger, MPH, Mary E. Reed, DrPH, James F. Holmes, MD, MPH; for the Clinical Research in Emergency Services and Treatment (CREST) Network

2 trauma centers, 4 community hospitals

1064 patients enrolled, 1000 CT’ed

Delayed hemorrhage in 4/687 warfarin patients, 2 died

Zero cases of delayed hemorrhage in 243 clopidigrel patients

• Patients on clopidigrel more likely to have immediate hemorrhage (12%) than those on warfarin (5%)

• Delayed hemorrhages on warfarin identified on days 1, 3, 3, and 7.
Take Home Messages:

• No delayed hemorrhage in patients on clopidogrel.

• Observation & repeat imaging may not be worth the benefit for patients on warfarin.

• Recommend good discharge instructions for patients and next day phone call follow up.

Dabigatran
• Review of closed head injuries over 4 months
• Dabigatran (5)
• Warfarin (15)
• No anticoagulant (25)

• 2/5 (40%) of Dabigatran patients died. None of the other 35 patients died.
Neurosurgical complications of direct thrombin inhibitors—
catastrophic hemorrhage after mild traumatic brain injury in
a patient receiving dabigatran

Case report

Sarah T. Garber, M.D., Walavan Sivakumar, M.D., and Richard H. Schmidt, M.D., Ph.D.

Department of Neurosurgery, University of Utah, Salt Lake City, Utah

Pray-daxa?

Bleed-ix?
My interpretation of the literature

• Risk goes up with INR and age.

• Repeat CTH unnecessary for antiplatelet agents.

• Observation & repeat imaging probably not worth the benefit for most patients on warfarin.

• Talk to your patients. Document appropriately. Good discharge instructions.

Thank You!

Any questions?