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Joshua Margolis

Robin Dharia, MD

Judy Diep, MD

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**Sidney Kimmel
Medical College™**
at Thomas Jefferson University

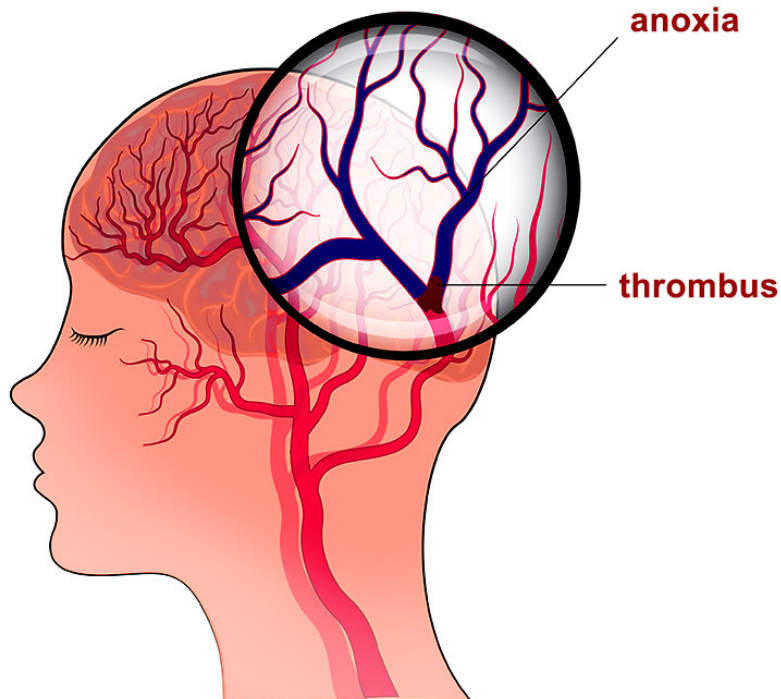
Antithrombotic Choice and Timing in Patients Presenting with Symptomatic Hemorrhagic Conversion

Joshua Margolis, Robin Dharia, MD*, Judy Diep, MD

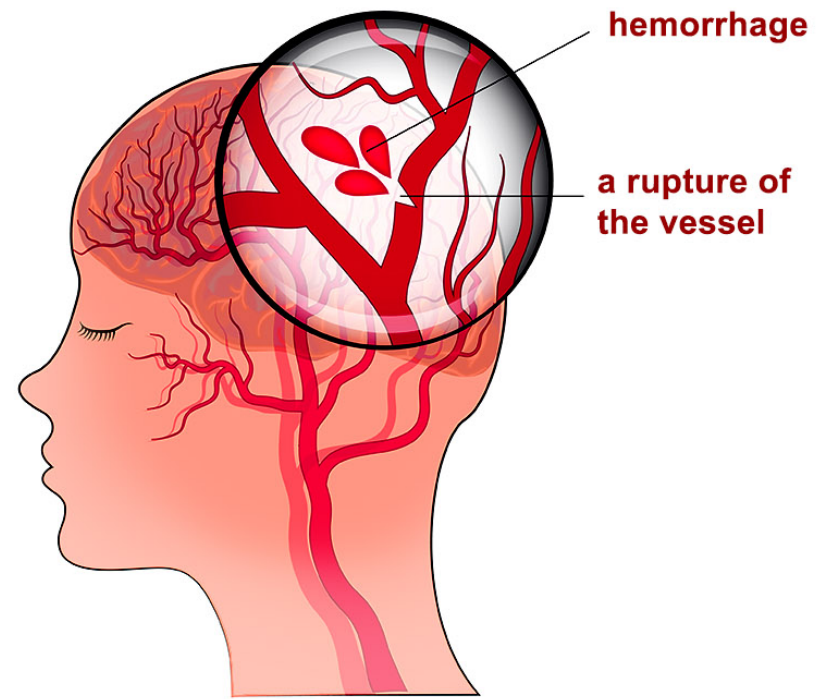


- Hemorrhagic conversion is a dangerous complication of ischemic stroke¹
 - Bleeding into infarcted area due to tissue injury
- Anticoagulation therapy for stroke prevention increases the risk of hemorrhagic conversion²
- Anticoagulation medications may currently be overused
 - Early anticoagulation therapy after ischemic stroke does not appear to significantly decrease the risk of recurrent embolic events³
- Current guidelines from American Stroke Association emphasize the urgent need for additional research on the management of acute ischemic stroke⁴

Two Types of Stroke



Ischemic Stroke



Hemorrhagic Stroke

Objectives & Hypothesis

- Research Question
 - What are the most significant risk factors for hemorrhagic conversion after acute ischemic stroke relating to choice and timing of antithrombotic therapy?
- Hypothesis
 - Commonly used anticoagulants such as Warfarin and Aspirin pose a significant risk for hemorrhagic conversion, outweighing their protective effects against further embolic events in the first two weeks after acute ischemic stroke.

Approach & Results

- Medical chart review of patients with hemorrhagic conversion at the Jefferson Center City Hospital
 - No intervention, just an analysis of previous patient outcomes
- Risk factors studied include:
 - Antithrombotic therapy
 - Medication initiation timing after initial stroke
 - Mechanism and location of stroke
 - Atrial fibrillation
 - Chronic disease (hypertension, renal disease, liver disease)
 - Substance abuse
- Multivariate analysis to look for associations among the risk factors

Approach & Results

- There is currently insufficient data for a full analysis (n=58)
 - Unexpectedly lower rates of patients with hemorrhagic conversion
 - Difficulties obtaining data due to coding variability
- Initial patients were pulled from a list of intracerebral hemorrhage (ICH) patients
 - Mostly hemorrhagic strokes rather than conversions
 - Not all hemorrhagic conversions are in the system as a separate hemorrhagic event
- Interestingly, 25 of the 58 patients bled on aspirin monotherapy
- More patient data is needed to draw any statistically significant conclusions



Conclusions

- Once more data is collected, the hope is to find new associations and evidence that will aid in the precise treatment of acute ischemic stroke
- We will identify specific antithrombotic therapies and timing of therapies that have strong associations with hemorrhagic conversion

Future Directions

- Now pulling from a list of ischemic stroke patients with atrial fibrillation
 - Likely to be on anticoagulants --> increased risk of hemorrhagic conversion
 - Continue to increase sample size
- Develop better evidence-based internal guidelines for acute ischemic stroke treatment at the Jefferson Comprehensive Stroke Center



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References

1. Sussman ES, Connolly ES. Hemorrhagic Transformation: A Review of the Rate of Hemorrhage in the Major Clinical Trials of Acute Ischemic *Stroke*. *Frontiers in Neurology*. 2013;4. doi:10.3389/fneur.2013.00069
2. Adams HP. Emergent Use of Anticoagulation for Treatment of Patients With Ischemic Stroke. *Stroke*. 2002;33(3):856-861. doi:10.1161/hs0302.104628
3. Paciaroni M, Agnelli G, Corea F, et al. Early Hemorrhagic Transformation of Brain Infarction: Rate, Predictive Factors, and Influence on Clinical Outcome. *Stroke*. 2008;39(8):2249-2256. doi:10.1161/strokeaha.107.510321
4. Powers WJ, Rabinstein AA, Ackerson T, et al. Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*. 2019;50(12). doi:10.1161/str.0000000000000211