

Intracerebral Hemorrhage: Nearing the end of a long dark night...

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Disclosures

- None

Objectives

- A historical perspective on hemorrhagic stroke
- Understanding the common causes of ICH
- Treatment approaches to ICH

First description of stroke?

- 1050 BC, King David describes
 - “...*Let my right hand wither, let my tongue affix to the roof of my mouth...*”



Is this a description of subarachnoid hemorrhage?

- *“... And he said unto his father “My head, my head!”... And when he had taken him, and brought him to his mother, he sat on her knees until noon and then died”*
 - *2 Kings 4:8-37*

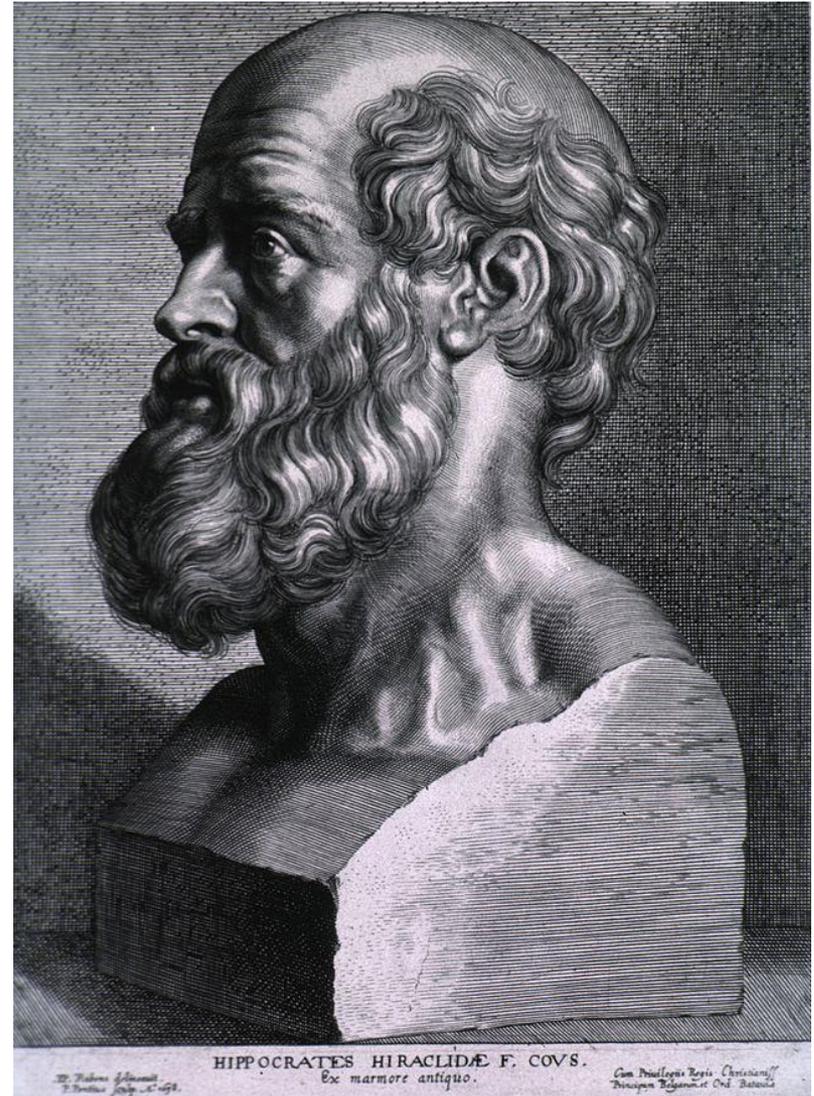


Subarachnoid Hemorrhage in 300 BC

- “... When persons in good health are suddenly seized with pains in the head, and straightway are laid down speechless, and breathe with stertor, they die in seven days, unless fever comes on...”
 - Hippocrates
- Today: 40% mortality within 7 days

Stroke in 300 BC

- “Apoplexy”
 - “To be struck down by violence, with no clear explanation”
- “Unaccustomed attacks of numbness and anesthesia are signs of impending apoplexy”
 - Probably first description of transient ischemic attack



HIPPOCRATES HIRACLIDÆ F. COVS.
Ex marmore antiquo.

Gen. Pinelloni Sculp. Christiani
Dessign. Johann. Chel. Batavi

First understanding of hemorrhagic stroke



- Johann Jakob Wepfer, 1620-1695
- *Historiae apoplecticorum*, published 1658
- Described four cases of apoplexy due to cerebral hemorrhage, including SAH

ICH in the present day

- About 20% of all stroke is due to ICH
- No direct treatment for common causes of ICH
- Up to 50% mortality in some populations

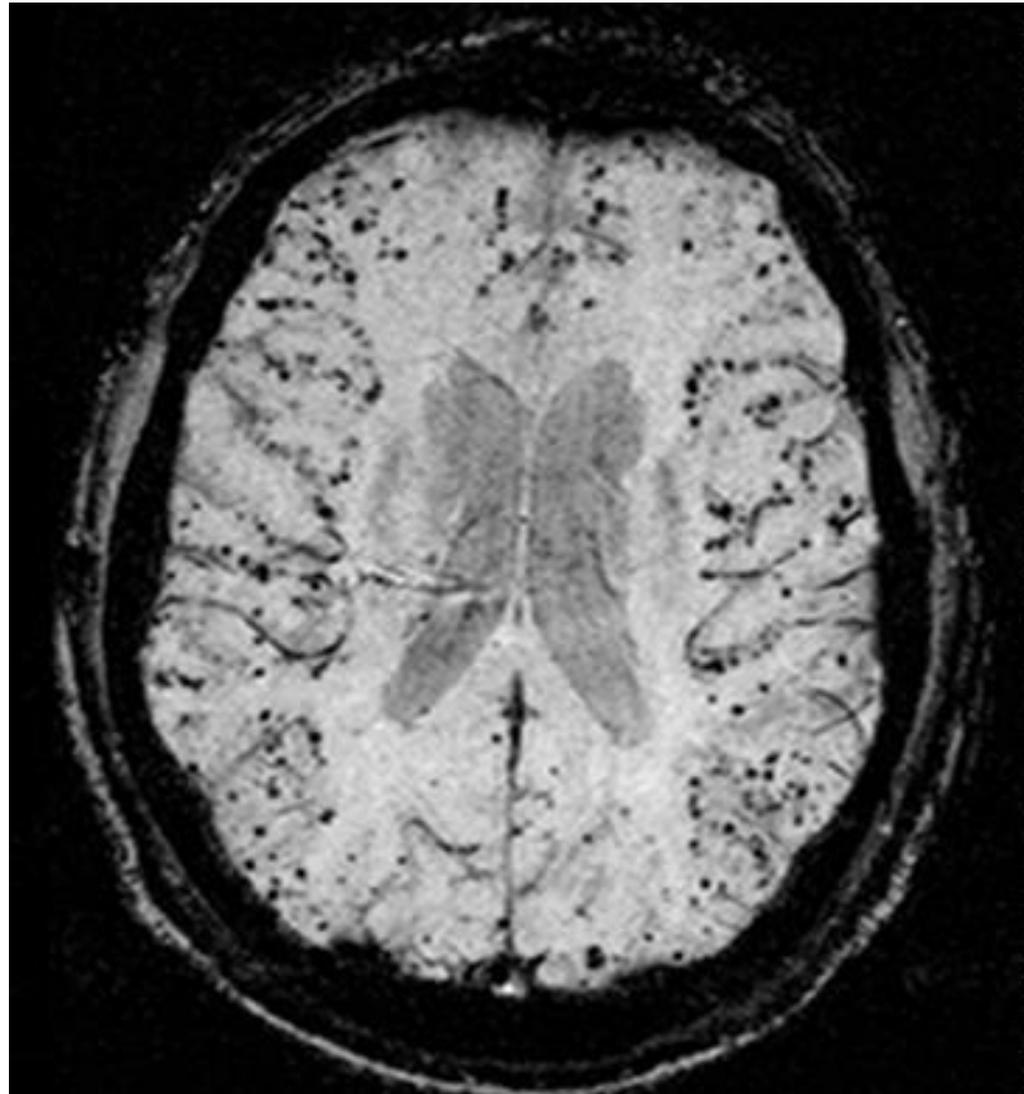
Causes of ICH

Amyloid angiopathy commonly causes lobar hemorrhage

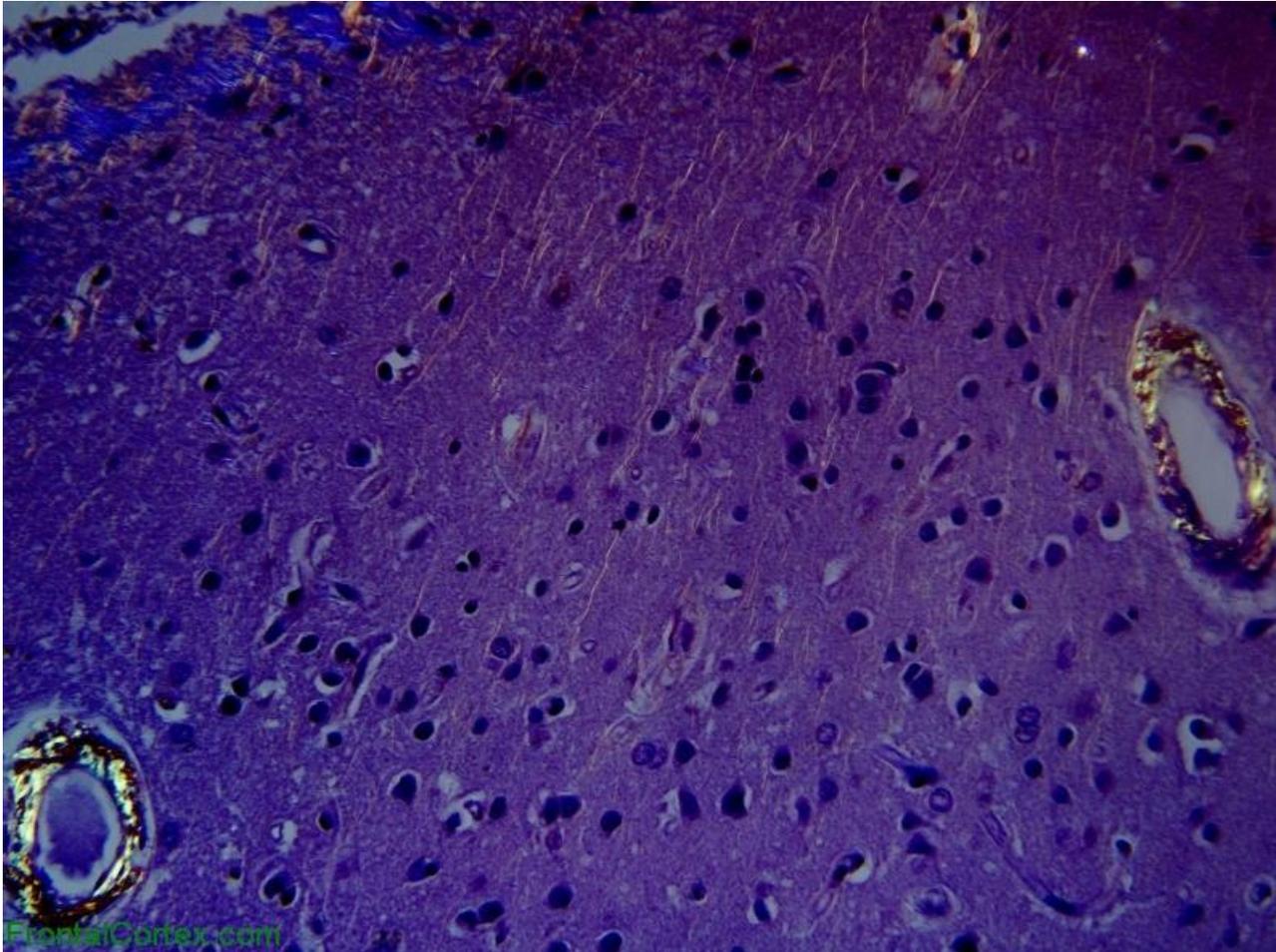
- Hematoma is within a lobe, involving grey and white matter
- Mass effect and increased intracranial pressure is often fatal



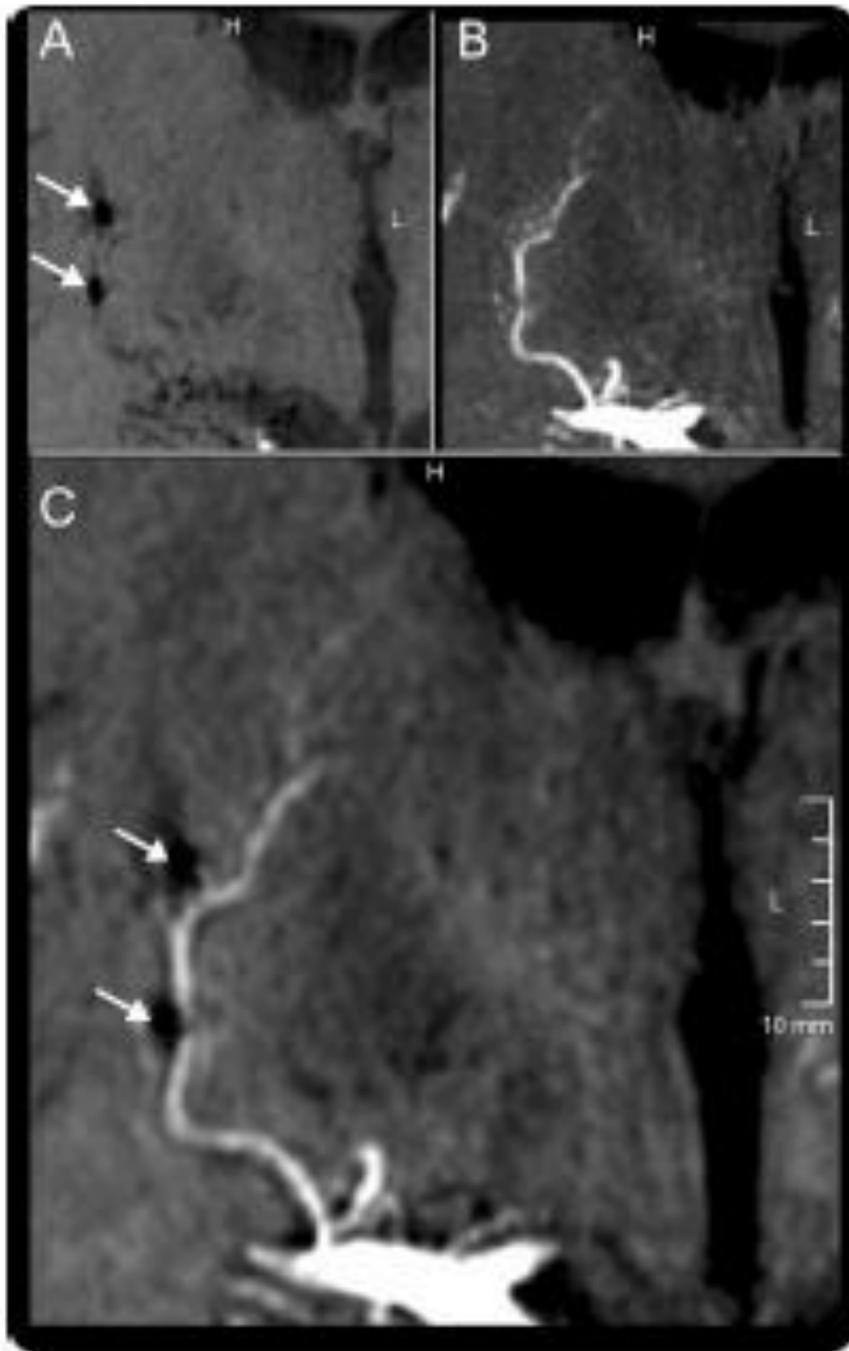
MRI of amyloid angiopathy



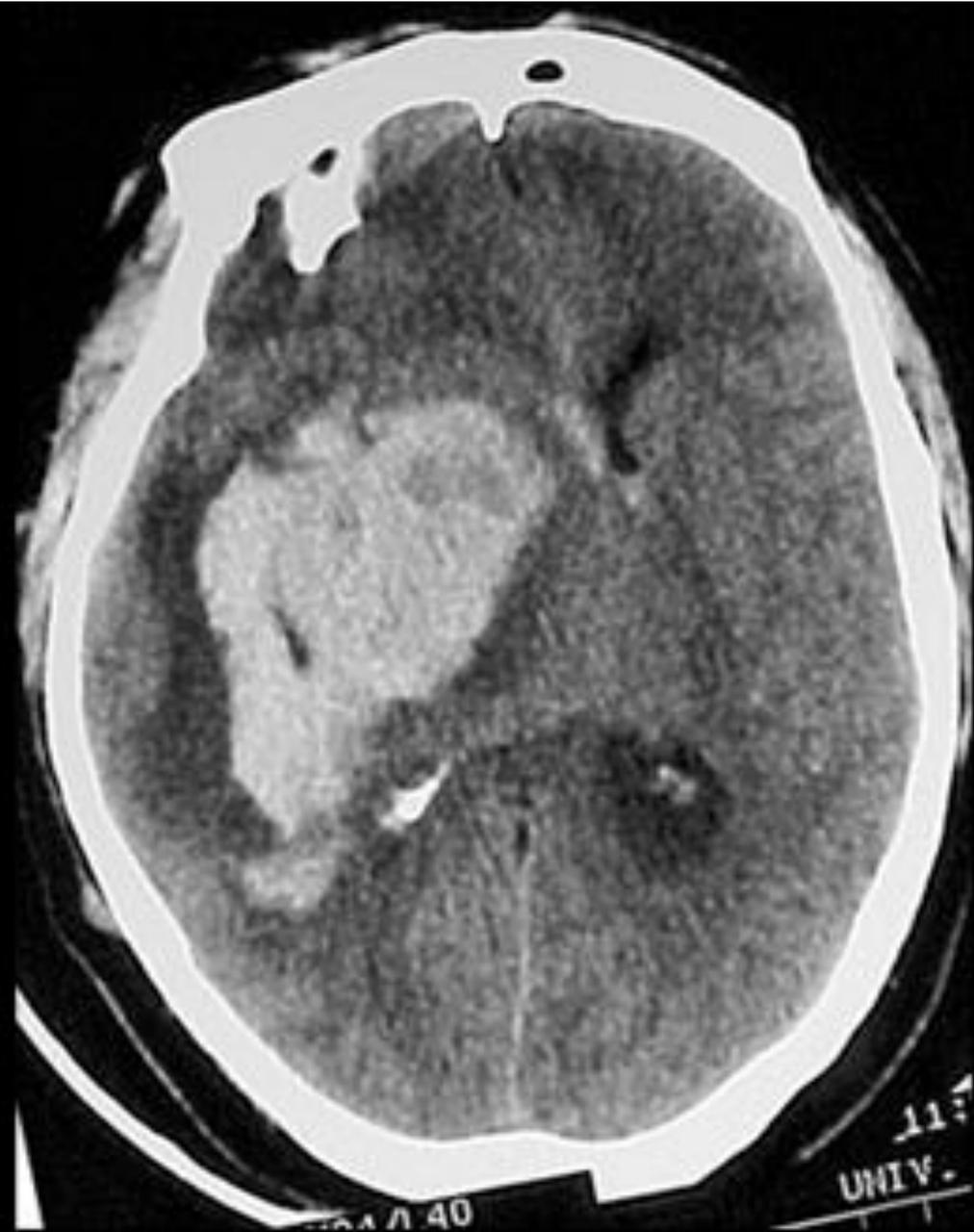
Cerebral Blood Vessels Affected by Amyloid Angiopathy

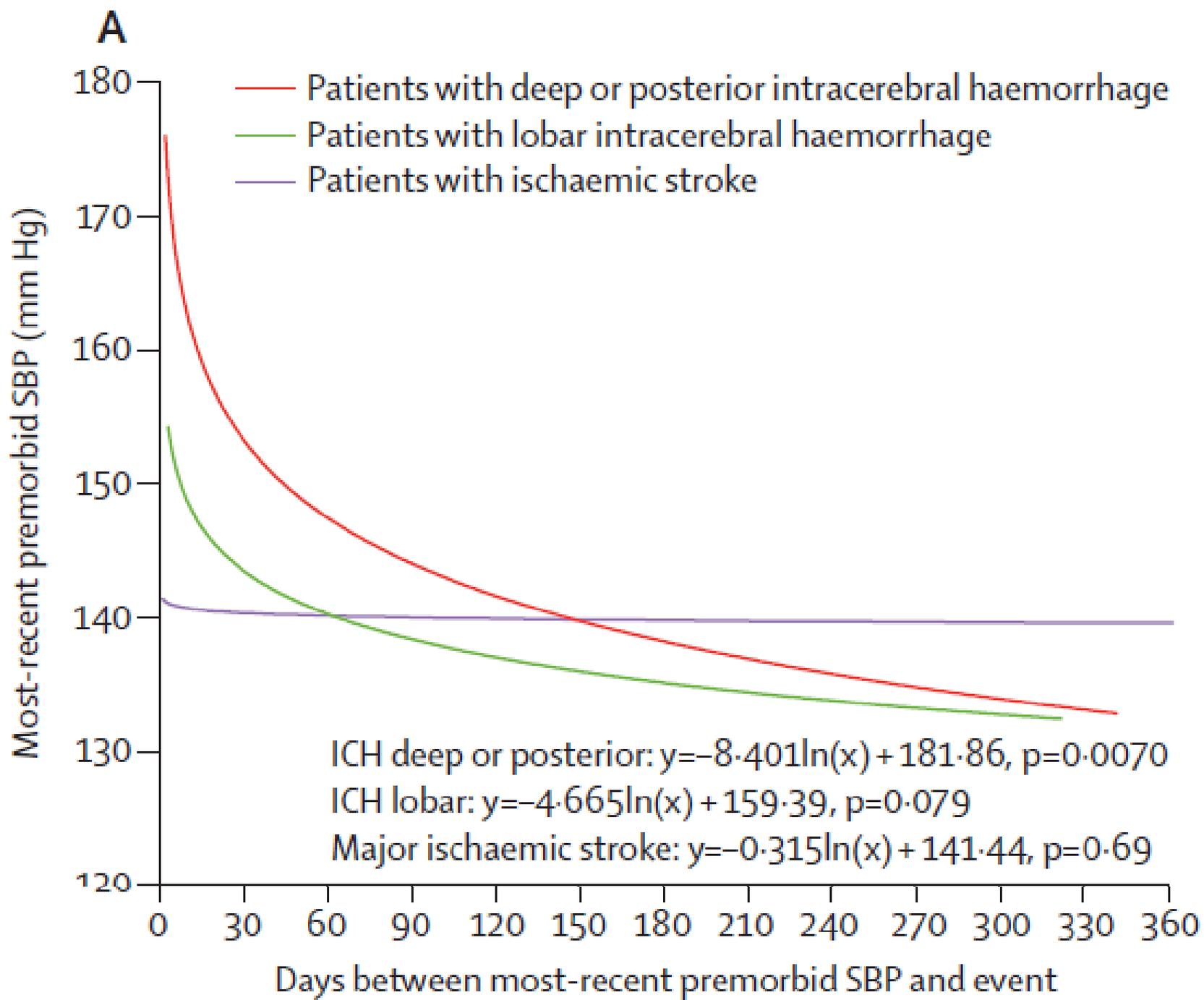


Intracerebral Hemorrhage from Hypertension



Hypertensive cerebral hemorrhage:
Imaging the leak with 7T MRI
Biessels et al *Neurology* 2010;75;572-3





ICH in (almost) real time

Blood Pressure Treatment and ICH

- INTERACT 2 and ATACH 2 trial
 - Aggressive BP lowering can be done safely
 - However, neither showed an improved outcome
 - Both trials had flaws in design and execution
- ICH ADAPT 2 trial is ongoing
 - Very early and aggressive BP lowering

- It took years before the proper application of IV tPA for acute ischemic stroke was understood
- BP management for ICH is still being explored...

So where does that leave us?

Where do we look for hope?

- The surprising thing is that we have learned that we are our own worst enemy when it comes to saving lives in ICH

Withdrawal of support in intracerebral hemorrhage may lead to self-fulfilling prophecies

K.J. Becker, MD; A.B. Baxter, MD; W.A. Cohen, MD; H.M. Bybee, BSN; D.L. Tirschwell, MD, MSc; D.W. Newell, MD; H.R. Winn, MD; and W.T. Longstreth, Jr., MD

Article abstract—*Background:* Withdrawal of support in patients with severe brain injury invariably leads to death. Preconceived notions about futility of care in patients with intracerebral hemorrhage (ICH) may prompt withdrawal of support, and modeling outcome in patient populations in whom withdrawal of support occurs may lead to self-fulfilling prophecies. *Methods:* Subjects included consecutive patients with supratentorial ICH. Radiographic characteristics of the hemorrhage, clinical variables, and neurologic outcome were assessed. Attitudes about futility of care were examined among members of the departments of neurology and neurologic surgery through a written survey and case presentations. *Results:* There were 87 patients with supratentorial ICH; overall mortality was 34.5% (30/87). Mortality was 66.7% (18/27) in patients with Glasgow Coma Score ≤ 8 and ICH volume >60 cm³. Medical support was withdrawn in 76.7% (23/30) of patients who died. Inclusion of a variable to account for the withdrawal of support in a model predicting outcome negated the predictive value of all other variables. Patients undergoing surgical decompression were unlikely to have support withdrawn, and surgery was less likely to be performed in older patients ($p < 0.01$) and patients with left hemispheric hemorrhage ($p = 0.04$). Survey results suggested that practitioners tend to be overly pessimistic in prognosticating outcome based upon data available at the time of presentation. *Conclusions:* The most important prognostic variable in determining outcome after ICH is the level of medical support provided. Withdrawal of support in patients felt likely to have a “poor outcome” biases predictive models and leads to self-fulfilling prophecies. Our data show that individual patients in traditionally “poor outcome” categories can have a reasonable neurologic outcome when treated aggressively.

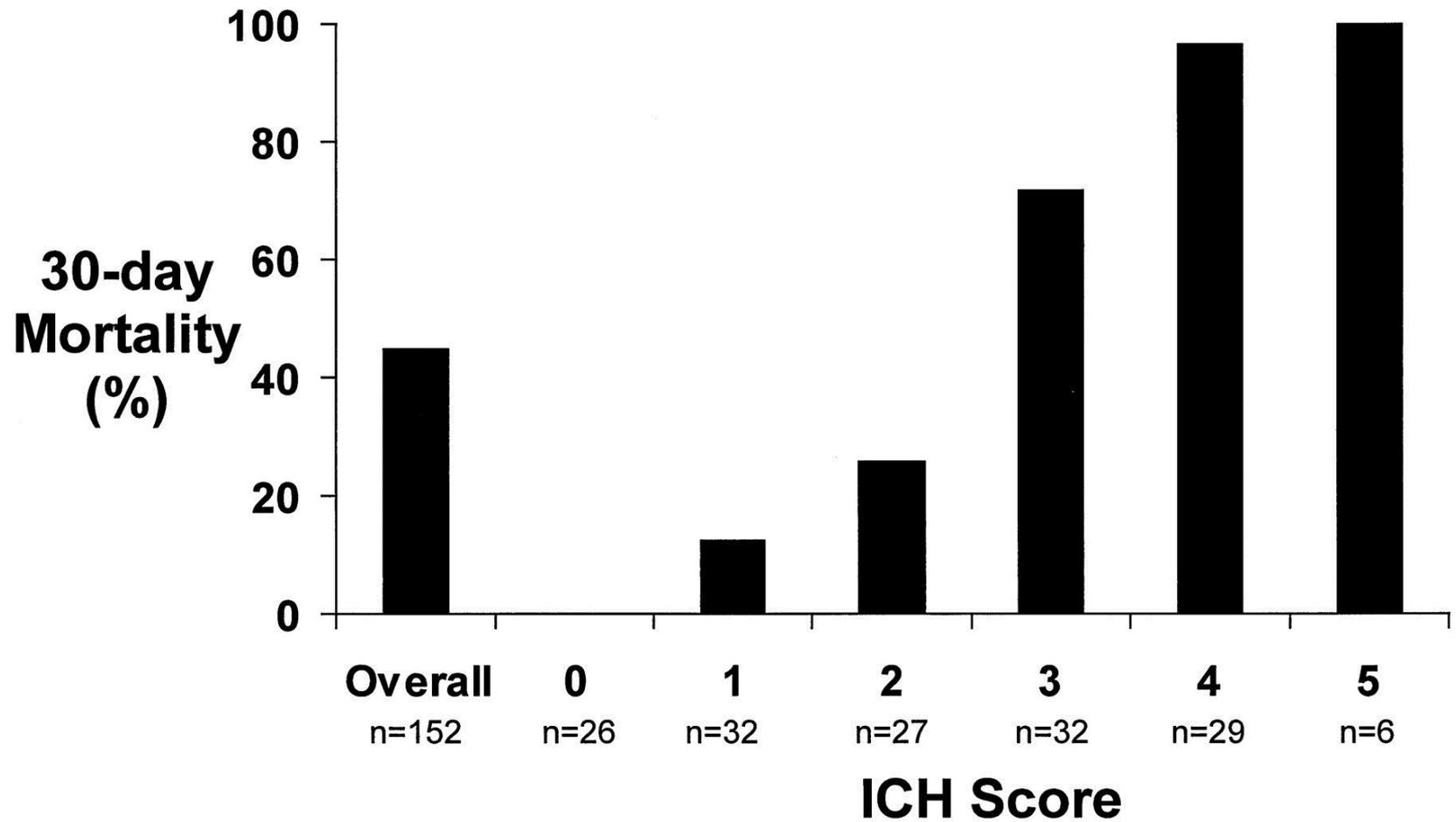
- When we make people DNR within the first 24 hours of hospital admission, they are more likely to die

- So why do we do this?

ICH Score

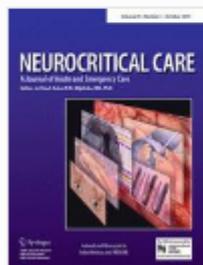
- Size of the hemorrhage
- Age
- Intraventricular extension
- Brainstem
- Level of consciousness

The ICH Score and 30-day mortality.



J. Claude Hemphill III et al. Stroke. 2001;32:891-897

- Rather than convincing ourselves that the patient is going to die, ie. Predicting mortality...
- ... Refocus on figuring out how patients can survive



[Neurocritical Care](#)

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Early Therapy Intensity Level (TIL) Predicts Mortality in Spontaneous Intracerebral Hemorrhage

Authors

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Wendy C. Ziai , Aazim A. Siddiqui, Natalie Ullman, Daniel B. Herrick, Gayane Yenokyan, Nichol McBee, Karen Lane, Daniel F. Hanley

These 5 points may save lives

- *Don't make people DNR* or withdraw care in the first 24 hours
- Treat hyperglycemia *within 4 hours*
- Reverse signs of herniation or increased intracranial pressure *within 1 hour*
- Maintain normothermia, i.e. *no fever allowed*
- Reverse coagulopathy to INR < 1.4 *within 2 hours of detection*

Full medical support for intracerebral hemorrhage



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ABSTRACT

Objective: This study tested the hypothesis that patients without placement of new do-not-resuscitate (DNR) orders during the first 5 days after intracerebral hemorrhage (ICH) have lower 30-day mortality than predicted by the ICH Score without an increase in severe disability at 90 days.

Methods: This was a prospective, multicenter, observational cohort study at 4 academic medical centers and one community hospital. Adults (18 years or older) with nontraumatic spontaneous ICH, Glasgow Coma Scale score of 12 or less, who did not have preexisting DNR orders were included.

Results: One hundred nine subjects were enrolled. Mean age was 62 years; median Glasgow Coma Scale score was 7, and mean hematoma volume was 39 cm³. Based on ICH Score prediction, the expected overall 30-day mortality rate was 50%. Observed mortality was substantially lower at 20.2%, absolute average difference 29.8% (95% confidence interval: 21.5%–37.7%). At 90 days, 27.1% had died, 21.5% had a modified Rankin Scale score = 5 (severe disability). A good outcome (modified Rankin Scale score 0–3) was achieved by 29.9% and an additional 21.5% fell into the moderately severe disability range (modified Rankin Scale score = 4).

Conclusions: Avoidance of early DNR orders along with guideline concordant ICH care results in substantially lower mortality than predicted. The observed functional outcomes in this study provide clinicians and families with data to determine the appropriate goals of treatment based on patients' wishes. *Neurology*® 2015;84:1739-1744

Patience and good care can win the day

- Expected 30-day mortality was **50%** based on ICH score
- Actual 30-day mortality was **20.2%**

Summary

- Two main causes of ICH:
 - Cerebral amyloid angiopathy
 - Hypertension
- Stay tuned for clinical trial results on lowering BP
- Avoid early DNR and don't let up on full medical support
 - This alone saves lives!!!