

Coagulopathy is an Independent Predictor of Inhospital Mortality in Patients with Acute Subdural Hematoma



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BACKGROUND AND SIGNIFICANCE

Acute subdural hematoma is one of the most lethal forms of intracranial injury. In these patients, one of the most important predictors of survival is early time to surgical evacuation of the hematoma. Unfortunately, some patients with acute subdural hematomas may have concurrent coagulopathy requiring reversal, which can take hours to correct, and thus delay surgery. Furthermore the hematoma may undergo expansion, exacerbating brain injury. Preliminary evidence suggests that patients with subdural hematoma who are coagulopathic may experience worse outcome compared to those with a normal coagulation profile.^{2,3} This effect has previously been observed in patients with intracerebral hemorrhage and trauma.⁴ We hypothesized that coagulopathy would also be a predictor of worse outcome in patients with acute subdural hematoma.

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METHODS

The records of all patients with acute subdural hematomas admitted to our Neurocritical Care Unit from Jun 1999 to June 2001 were reviewed. The hospital institutional review board approved the study.

The following data was obtained from a prospectively collected database:

1. Demographics
2. Admission source
4. Neuro ICU and hospital disposition
5. Admission APACHE III score
6. Principal and secondary diagnoses.
7. Reasons for admission to the Neuro-ICU
8. GCS score on admission to the hospital

The following variables were obtained retrospectively:

1. Prior functional status (PFS)
2. Cause of death.
3. Time to correction of coagulopathy
4. Type of treatment to correct coagulopathy
5. Admission coagulation values* (PT, PTT, INR)

*Coagulopathy was defined as INR > 1.2.

Patient admission baseline characteristics recorded included: age, gender, race, medical comorbidities (hypertension, coronary artery disease, cigarette use), use of anticoagulant medication, mean arterial pressure (MAP), and neurologic status using the GCS score.

The Acute Physiology and Chronic Health Evaluation (APACHE III) scoring system was obtained from our institution ICU database. This scale was designed to estimate mortality in the ICU. Its components include: physiologic abnormalities, age, and chronic health status: sum 0-299 (Physiologic: 0-252; age: 0-24; chronic health evaluation: 0-23). The APACHE III can be also be used for risk stratification by measuring the severity of disease.

Long-term mortality was accessed by the Social Security Death Index.

Statistical Analysis:

Univariate analysis was carried out using t-Test or Chi-square as indicated (significance, $p < 0.05$). A logistic regression model was used to adjust for other covariates and create a prediction model for in-hospital mortality and admission characteristics.

RESULTS

We identified 244 patients with a mean age 71.3 ± 15 years; Sixty-one percent of patients were men.

Univariate analysis comparing coagulopathic vs. non-coagulopathic patients

	Non-coagulopathic (INR \leq 1.2)	Coagulopathic (INR $>$ 1.2)	P-value
Age:	70 \pm 16	75 \pm 13	0.08
PFS			
Independent:	122 (64%)	34 (64%)	Reference
Mild:	44 (23%)	15 (28%)	0.28
Moderate:	23 (12%)	2 (4%)	0.02
Severe:	2 (1%)	2 (4%)	0.18
ICU LOS:	4 \pm 3	4 \pm 4	0.39
Hosp LOS:	8 \pm 7	9 \pm 7	0.69
APACHE III:	42 (15 - 105)	54 (11 - 119)	<0.01
Inhospital Death:	17 (9%)	12 (23%)	<0.01
GCS $<$ 8	26 (14%)	15 (28%)	0.01
MV:	31 (16%)	14 (26%)	0.09
WS:	12 (6%)	8 (15%)	0.04

Abbreviations: PFS = prior functional status; LOS = length of stay; APACHE = acute physiology and chronic health evaluation; GCS = Glasgow coma scale; MV = mechanical ventilation; WS = Withdrawal of support

Independent predictors of in-hospital mortality included the following:

- APACHE III score (OR 4.4, 95% CI 1.4-13.4, $p=0.011$)
- Coagulopathy (OR 2.7, 95% CI 1.1-7.1, $p=0.037$).
- Surgical evacuation of acute subdural hematoma was associated with decreased in-hospital mortality (OR 0.2, 95% CI 0.1-0.6, $p=0.003$).

Median time to correction of coagulopathy was 29 hours (range 7-72)

CONCLUSIONS

Coagulopathy on admission and APACHE III scores were independent predictors of in-hospital mortality in patients with acute subdural hematomas. Surgical removal of the hematoma independently predicted better outcome. The time to reversal of coagulopathy with fresh frozen plasma and vitamin K was prolonged. There is a need for randomized controlled trials to test alternative treatments for rapid reversal of coagulopathy in acute subdural hematoma patients.