Prediction of Mortality After Evacuation of Supratentorial Spontaneous Intracerebral Hemorrhage

#1215

Haydn Hoffman M.D., Muhammad S. Jalal B.S., Lawrence S. Chin M.D.

State University of New York Upstate Medical University
Disclosure

• The authors have no relevant financial or personal interests to disclose
Introduction

• Surgical management of supratentorial spontaneous intracerebral hemorrhage (sICH) includes craniotomy or craniectomy with clot evacuation
• Although the effect of surgery has been studied extensively, predictors of mortality after surgical management of sICH have not
  – Adequate selection of surgical candidates for hematoma evacuation is essential for achieving a satisfactory postoperative outcome
• The goal of this study was to use the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database to identify variables associated with 30d mortality
Methods

• Data was extracted from the 2006 through 2017 NSQIP Participant Use Data Files to identify adults who underwent supratentorial craniotomy for sICH evacuation
• Primary outcome of interest was mortality within 30 days
• Binary logistic regression was used to identify predictors for 30d mortality while adjusting for several demographic and perioperative variables
Results

• After applying the exclusion criteria, 751 patients were included in the study

• There were 175 (23.3%) patients who died within 30 days after surgery

• The majority of patients (85.1%) experienced a non-routine discharge
Results (cont.)

- In a binary logistic regression, the following exposure variables were associated with 30d mortality:
  - Age > 65 (OR 2.90, 95% CI 1.57-5.34)
  - BMI 40+ (OR 2.18, 95% CI 1.03-4.58)
  - Mechanical ventilation (OR 2.28, 95% CI 1.54-3.37)
  - SIRS (OR 1.79, 95% CI 1.18-2.73)
  - Septic shock (OR 5.16, 95% CI 1.03-25.77)
  - Thrombocytopenia (< 150) (OR 1.66, 95% CI 1.02-2.73)
Results (cont.)

• We developed a scoring system to estimate postoperative 30-day mortality using preoperative data
  – The $\beta$ coefficients corresponding to the significant predictors from the binary logistic regression for mortality were rounded to the nearest 0.25 and multiplied by a factor of 4 to obtain integers

• Incidence of mortality = $5.2 \times (4[\text{age}>65] + 3[\text{BMI} \geq 40] + 3[\text{mechanical ventilation}] + 2[\text{SIRS}] + 6[\text{septic shock}] + 2[\text{thrombocytopenia}]) + 4.2$
  – Value of 0 or 1 is applied to the given variable if it is absent or present, respectively
Results (cont.)

- Score was found to be linearly associated with incidence of 30-day mortality ($R^2 = 0.78$, $p = 0.002$)
- AUC in the ROC curve was 0.66 (95% CI 0.62-0.71) and the Hosmer and Lemeshow $p$ value was 0.773
Discussion

• Similar to prior reports, we found high rates of 30-day mortality (23.3%) and non-routine disposition (85.1%) after surgery for sICH

• The scoring system that we developed can aid in identifying candidates for surgery and counseling patients’ families regarding utility of surgery

• Strong linear association between score and observed outcome

• The C statistic and Hosmer-Lemeshow test showed good discriminatory capacity and calibration of the score, respectively
Summary points

• 30d mortality after surgery for supratentorial sICH was 23.3%

• Age > 65, BMI 40+, mechanical ventilation, SIRS, septic shock, and thrombocytopenia were associated with 30d mortality
  – These factors can be combined in a simple formula for clinical use to estimate risk of 30d mortality after surgery