

Evaluating Platelet Transfusion as a Therapy for Traumatic Intracranial Hemorrhage

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Introduction

- Approximately 1.7 million people experience traumatic brain injury in the United States every year [1]. Within this population of 1.7 million people, traumatic brain injury results in 1.4 million emergency department visits, 275,000 hospitalizations, and 53,000 deaths [2].
- Platelet transfusion is currently of unclear efficacy as a therapy for traumatic intracranial hemorrhage. Establishing the strength of platelet transfusion as a predictive factor in determining patient outcomes would elucidate its value as a treatment choice, helping to reduce morbidity and mortality.

Methods

- A 2003-2013 consecutive case series of 2183 patients with intracranial hemorrhage from our institution's trauma registry were identified.
- Patient disposition, categorized into "home," "rehab/skilled nursing," and "hospice/death," was used as a dependent variable in a logistic regression to evaluate the role of platelet transfusion.
- Independent variables that were controlled for included sex, age, systolic blood pressure, craniectomy, externalized ventricular drain placement, international normalized ratio, blood alcohol level, anticoagulation status, Glasgow Coma Scale (GCS), Injury Severity Score (ISS), and anti-platelet therapy status.
- All possible logistic regressions were run and assigned Akaike Information Criterion scores. The logistic regression with lowest corrected Akaike Information Criterion score was selected.

Results

- An initial logistic regression using all variables found platelet transfusion to be an insignificant predictor of patient disposition.
- The subsequent logistic regression with the lowest Akaike Information Criterion score excluded platelet transfusion as a predictive element in determining patient outcome.

| Best prediction model by AIC | | | |
|------------------------------|--------|------------------|-----------------|
| parameter | OR | 95% CI | <i>p</i> -value |
| Sex [†] | 0 | - | - |
| Age (years) | 1.053 | [1.0476, 1.0582] | 2.298e-88 |
| SBP (mmHg) | 0.9972 | [0.9938, 1.0005] | 0.0994 |
| APC (10 ³ /µL) | 0.9983 | [0.9972, 0.9995] | 0.0043 |
| BAL (mg/dL) | 0.9971 | [0.9960, 0.9982] | 1.732e-07 |
| INR | 1.074 | [1.0076, 1.1451] | 0.0283 |
| Anticoagulant use | 1.827 | [-2.0, 8.7] | 2.671e-06 |
| Antiplatelet use | 0 | - | - |
| GCS (3-15) | 0.8027 | [0.7829, 0.8229] | 5.739e-67 |
| ISS (0-75) | 1.090 | [1.0773, 1.1018] | 1.721e-50 |
| PL-T | 0 | - | - |
| EVD | 0 | - | - |
| Craniectomy | 1.437 | [1.0339, 1.9974] | 0.0309 |
| [†] Male = 1. | | • | |

AIC = Akaike Information Criterion, APC = absolute platelet count, BAL = blood alcohol level, CI = confidence interval, EVD = externalized ventricular drain, GCS = Glasgow Coma Scale, INR = international normalized ratio, ISS = Injury Severity Score, PL-T = platelet transfusion, SBP = systolic blood pressure

Discussion

- This study provides evidence that therapeutic platelet administration may not benefit patients with traumatic intracranial hemorrhage.
- While some papers have demonstrated a positive effect on mortality after platelet transfusion [3,4], the majority of the literature has found the opposite result [4,5].
- All of the papers that have previously addressed this topic have only examined the effect of platelet transfusion on mortality in patients on prior antiplatelet therapy. While administration of platelets to patients on antiplatelet therapy is common, our data demonstrated that absolute platelet count was a better predictor of which patients would receive transfusion than prior antiplatelet status.
- A future randomized control trial would greatly improve our understanding of the efficacy of platelet transfusions in treating traumatic intracranial hemorrhage.

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