Tranexamic Acid and Trauma

KARL SPORER, ALAMEDA COUNTY EMS AGENCY
ORIGINAL RESEARCH

Tranexamic Acid in Civilian Trauma Care in the California Prehospital Antifibrinolytic Therapy Study

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Tranexamic Acid
- Inhibits Fibrinolysis
- CRASH 2 Trial demonstrated 1.5 to 2.4% mortality benefit in severe trauma patients
- 20,000 patients were randomized
- Secondary studies demonstrated that earlier use improved survival
California Prehospital Fibrinolytic Trial

- Multi center, prospective cohort with a retrospective cohort
- Three California Counties implemented TXA in 362 severe trauma patients
  - San Bernardino
  - Riverside
  - Alameda

- 362 Propensity Score Matching Cases
California Prehospital Fibrinolytic Trial

- Primary Outcomes
  - Mortality at 24 hours, 48 hours, 28 days
  - Total Blood Products
  - Hospital and ICU length of stay
California Prehospital Fibrinolytic Trial

- Mortality at 28 Days
  - TXA 3.6%
  - Control 8.3%
- Severely injured (ISS >15), 28 day mortality
  - TXA 6%
  - Control 14.5%
- Significant Reduction in Blood Transfusion requirements
California Prehospital Fibrinolytic Trial

- Real World Implementation in three counties
- Hospital infusion is commonly not performed
- Average to poor EMS compliance
- Morality and Blood Transfusion improvements despite these issues
TXA in TBI

(2 gm IV bolus appears be beneficial in ICH)

Craig Manifold, DO
Sharing information presented at the 2018 Military Health System Research Symposium
A Two Gram Bolus of Tranexamic Acid Improves Survival After Traumatic Brain Injury in Patients with Intracranial Hemorrhage

Martin A. Schreiber MD FACS
COL, MC, USAR
Professor of Surgery
Oregon Health & Science University
• 3-arm randomized trial (1:1:1)
• Multi-center, multi-national
• Double-blinded
• Key coded kits placed on rigs and replaced at trauma center when used
To determine the effects of two dosing strategies of TXA on outcome following moderate to severe TBI
• No difference in favorable neurologic outcome at 6 months (primary)
• No difference in 28 day survival
• No difference in morbidity

Comparing patients who received 2 dosing strategies of TXA to those who did not receive TXA
**Inclusion Criteria**
- Blunt or penetrating TBI
- GCS = 3 - 12
- Prehospital SBP ≥ 90 mmHg
- Age ≥15 y/o, or ≥50 kg, if age unknown
- IV placed
- Planned transport to participating hospital

**Exclusion Criteria**
- GCS = 3 with no reactive pupil
- > 2 hours from time of injury or time unknown
- Any prehospital CPR
- Seizures, MI, stroke, dialysis
- Known or suspected prisoners
- Known/suspected pregnancy
- Drowning or hanging
- Burns >20% TBSA
- TXA or pro-coagulant drug
- Opt out
Randomization Groups

- 2 gram PH bolus, 8 hour IH placebo infusion
  - BO
- 1 gram PH bolus, 8 hour IH 1 gram infusion
  - BM
- Placebo PH bolus, 8 hour IH placebo infusion
  - PB
• Enrollment from May 2015 – Mar 2017
• 967 patients randomized and received drug
  • 346* BO
  • 312 BM
  • 309 PB

* 1 excluded from analysis because enrolled while in police custody
<table>
<thead>
<tr>
<th>Mortality</th>
<th>28-Day Mortality, n (%)</th>
<th>OR for 28-Day Mortality (95% CI)</th>
<th>Pairwise Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PB  BM  BO</td>
<td>BM v. PB  BO v. PB  BO v. BM</td>
<td></td>
</tr>
<tr>
<td>All patients</td>
<td>53 (17) 53 (17) 41 (12)</td>
<td>1.01 (0.66, 1.55) 0.66 (0.42, 1.03) 0.65 (0.42, 1.02)</td>
<td></td>
</tr>
<tr>
<td>ICH on initial CT</td>
<td>51 (28) 51 (28) 36 (18)</td>
<td>1.03 (0.56, 1.88) 0.47 (0.25, 0.89) 0.46 (0.25, 0.86)</td>
<td></td>
</tr>
<tr>
<td>Key adverse events, n (%)</td>
<td>PB N = 309</td>
<td>BM N = 312</td>
<td>BO N = 345</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td>Seizure</td>
<td>7 (2)</td>
<td>5 (2)</td>
<td>17 (5)</td>
</tr>
<tr>
<td>Any thromboembolic event</td>
<td>30 (10)</td>
<td>13 (4)</td>
<td>32 (9)</td>
</tr>
<tr>
<td>MI</td>
<td>1 (0)</td>
<td>3 (1)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>PE</td>
<td>5 (2)</td>
<td>3 (1)</td>
<td>6 (2)</td>
</tr>
<tr>
<td>Thrombotic stroke</td>
<td>10 (3)</td>
<td>3 (1)</td>
<td>13 (4)</td>
</tr>
<tr>
<td>DVT</td>
<td>9 (3)</td>
<td>3 (1)</td>
<td>9 (3)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (3)</td>
<td>1 (0)</td>
<td>13 (4)</td>
</tr>
</tbody>
</table>
Conclusions

• Prehospital TXA use is feasible
• Does not result in favorable GOSE at 6 months
• Does not affect TEG on admit
• 2 grams prehospital TXA results in improved 28 day survival in patients with ICH
• 1\textsuperscript{st} therapeutic with evidence for benefit in acute TBI
• What about hemorrhagic shock?
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Prehospital Blood Transfusion in a Metropolitan City

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Plan

Outside of Bexar County

Dead/Total = 69/108 (64%);
Avg PreHosp Time ALL = 30.8 minutes (available for 101 of 108 patients)

Inside Bexar County

1 patient
2 patients
3 patients
4 patients
5 patients
7 patients
Hospital

Dead/Total = 55/85 (65%)
Avg PreHosp Time = 28.8 min

MTP Patients by Ground

UHS + SAMMC
January 1, 2016 – August 31, 2018
Equip and Train
Deploy
Woman survives traumatic crash thanks to new resource on SAFD EMS units

By Sarah Acosta - Reporter, Joe Herrera - Photojournalist

Posted: 8:40 PM, February 19, 2019
Updated: 3:29 AM, February 20, 2019
Questions?
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