A microscopic view of red blood cells and a fibrin mesh. The red blood cells are bright red and biconcave, while the fibrin mesh is a complex, yellowish-white network of fibers. The background is dark, making the cells and fibers stand out.

A Retrospective Chart Review Evaluating the
Effects of Tranexamic Acid on Postoperative
Hemoglobin Levels and The Need for
Transfusion After Primary Total Hip
Arthroplasty, Total Knee Arthroplasty and
Revision Procedures.

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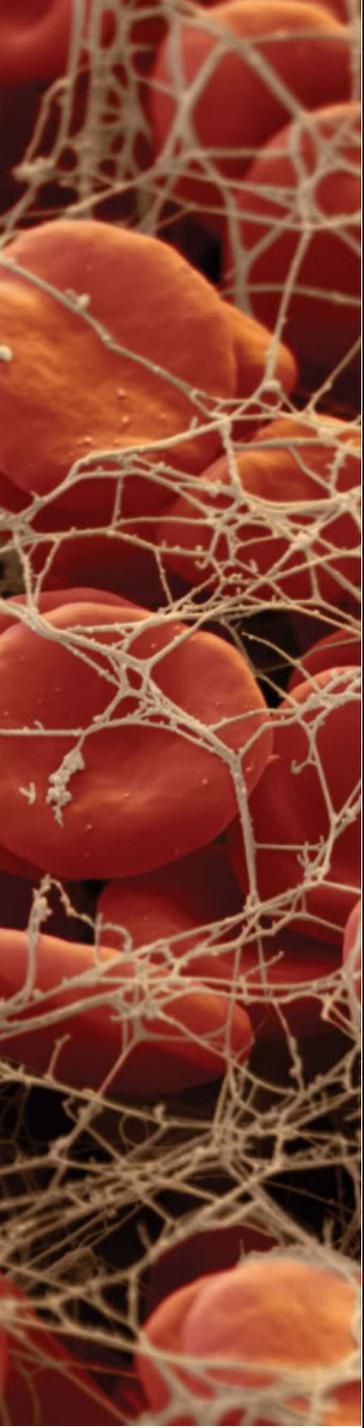
September 13th, 2017

“Diversity and Inclusion in Practice”

Overview

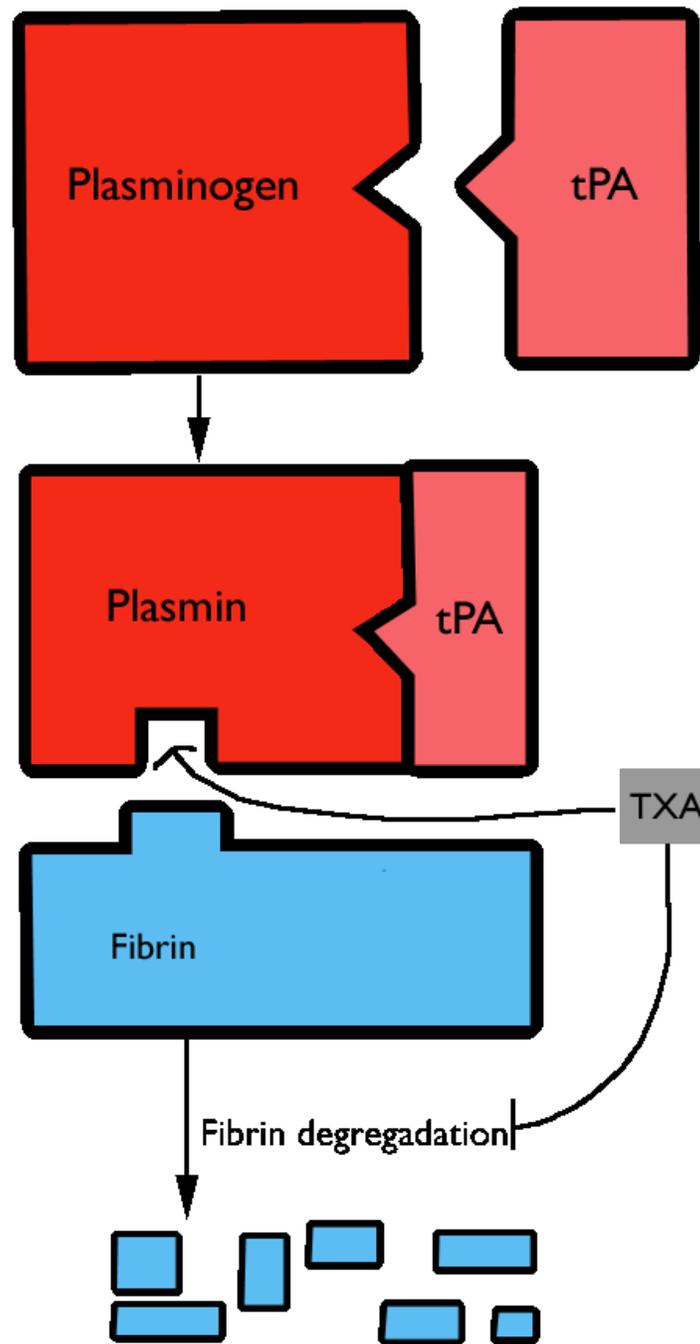
- Introduction
- Historical/Background Perspective of TXA
- Pharmacodynamics
- Literature Review
- Methodology
- Inclusion Criteria & Exclusion Criteria
- Dosing Regimen
- Anesthetic Management
- Results
- Conclusion

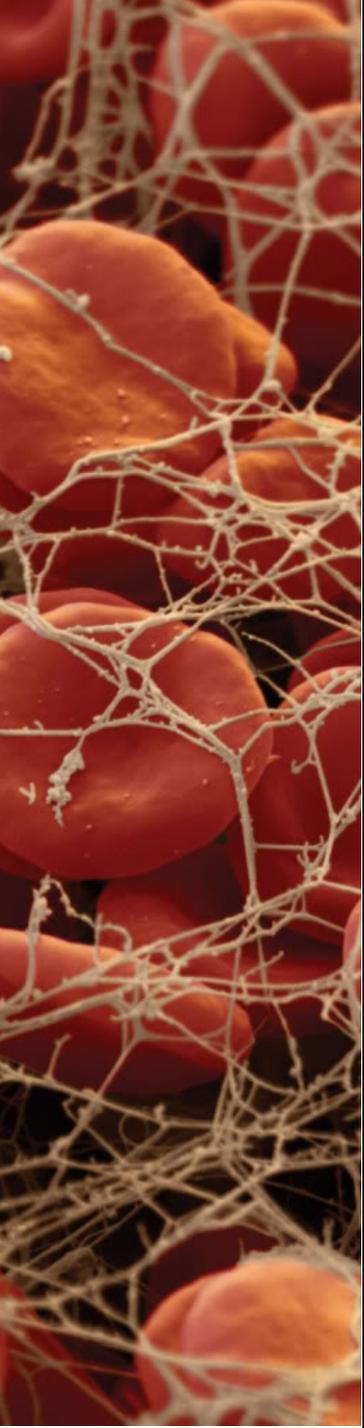




TXA Pharmacodynamics

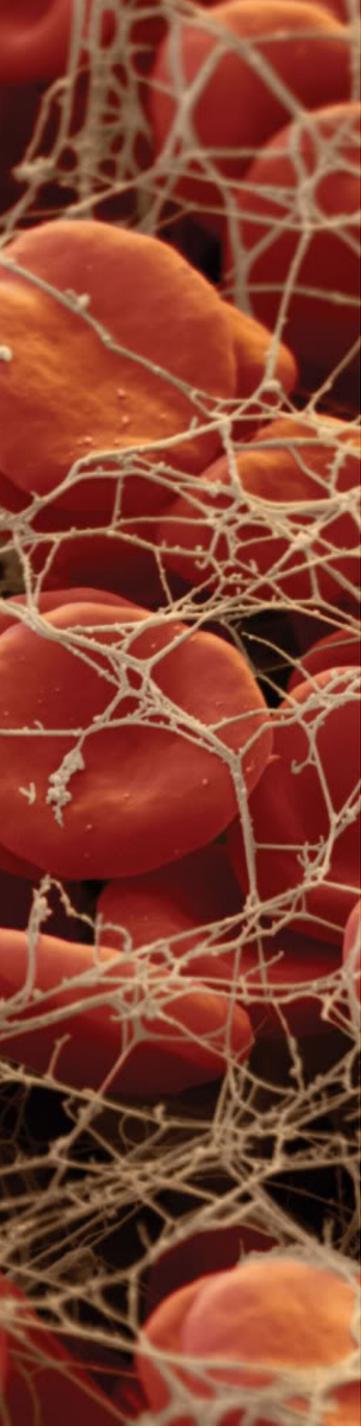
- Tissue plasminogen activator (tPA) binds to and activates plasminogen to plasmin. The lysine binding site for fibrin is blocked by TXA inhibiting fibrin degradation and promoting clot stabilization.
- After IV administration of TXA its metabolism is triexponential, >95% is eliminated unchanged in urine, total cumulative excretion is ~90% in 24hrs.
- 3% is bound to plasminogen which crosses the blood brain barrier and the placenta, and very little is excreted in breast milk.
- Other lysine analogs include Aminocaproic Acid and Aprotinin.
- It is 6-10x more potent than Aminocaproic Acid.



A microscopic image showing a dense network of yellowish, fibrous structures (fibrin) overlaid on several bright red, spherical cells (red blood cells).

Literature Review

- **CRASH 2 Study (2013)** - RCT in 274 Hospitals 40 Countries- 20,211 adult trauma patients.
- **MATTERs Study (2012)** - Retrospective Observational at a Role 3 Echelon Hospital 896 admissions, 293 received TXA. British soldiers > survival rates than U.S. soldiers which as a group did not receive TXA.
- **Liu, Chen, & Wen (2016)** - 10,321 pts from 159 Hospitals in Taiwan – 47% odds reduction in blood transfusion with TXA use.
- **Poeran et al (2014)** - Retrospective Study 872,416 Total Hip & Knee Arthroplasty from 510 Hospitals from 2006-12, effective in reducing blood transfusions while not increasing risk of complications.
- **BART Study**-Fergusson et al published their findings in which they noted, Among patients undergoing high-risk cardiac surgery, they documented an increase of 2 percentage points in the rate of death (from ~ 4% to 6%) among patients receiving Aprotinin, as compared with those receiving either Tranexamic Acid or Aminocaproic acid. The observed increase in mortality translates into a number needed to harm of 50 patients. When they compared the combined mortality rates in the lysine-analogue groups with the rate in the Aprotinin group, they noted a significant absolute increase of 2.1%, or a relative increase of 54%, in the number of deaths in the Aprotinin group (Fergusson et al, 2008). In response to this study the FDA has withdrawn Aprotinin (Trasylol) from the U.S. market (Achneck et al, 2010).
- **Harris, Moskal and Capps (2015)** - Cost of 1 unit PRBC ~ \$1,130/unit \$291/additional; Cost of a two dose regimen of TXA \$78.28. Also noted the cost of adverse blood transfusion rxn. after 1st unit was ~\$1197.00.



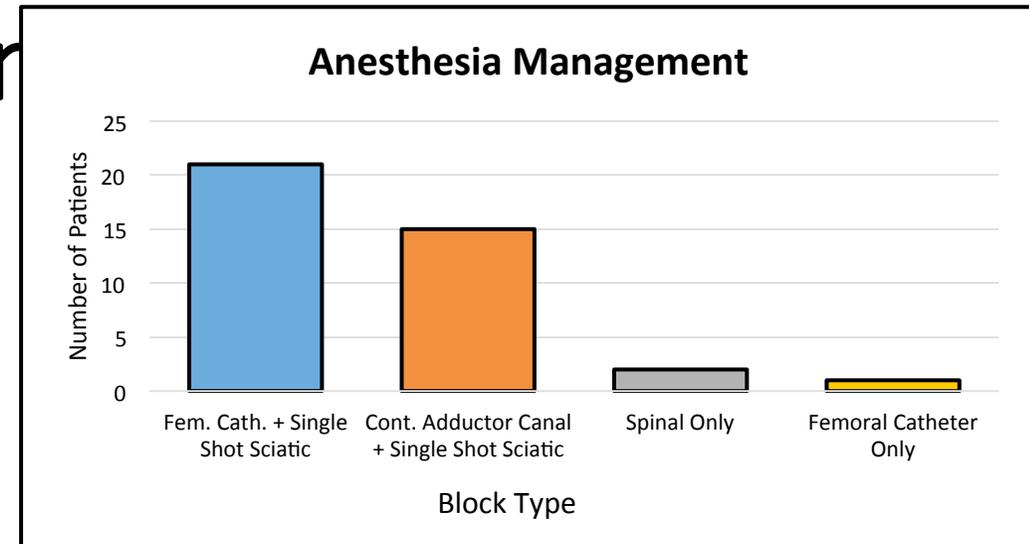
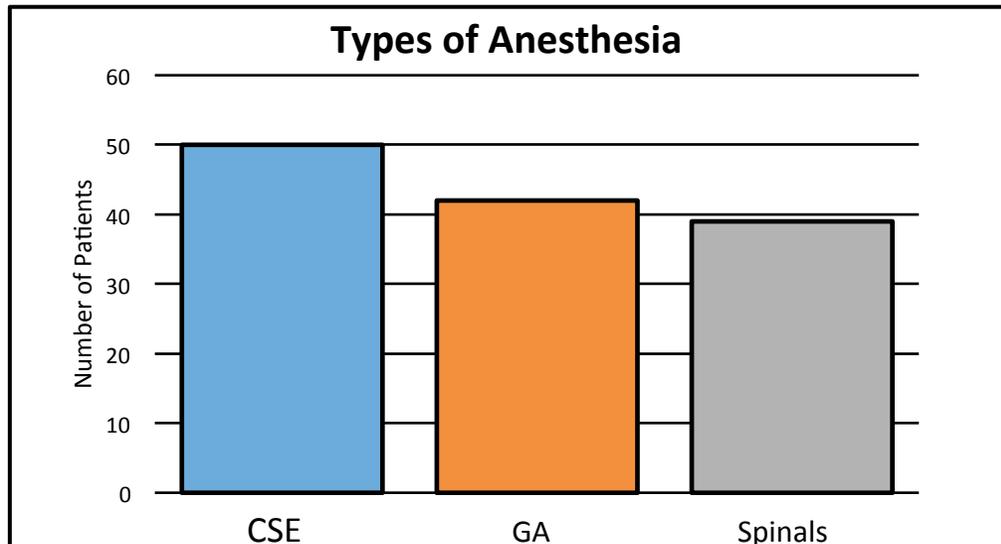
Methodology & Checklist

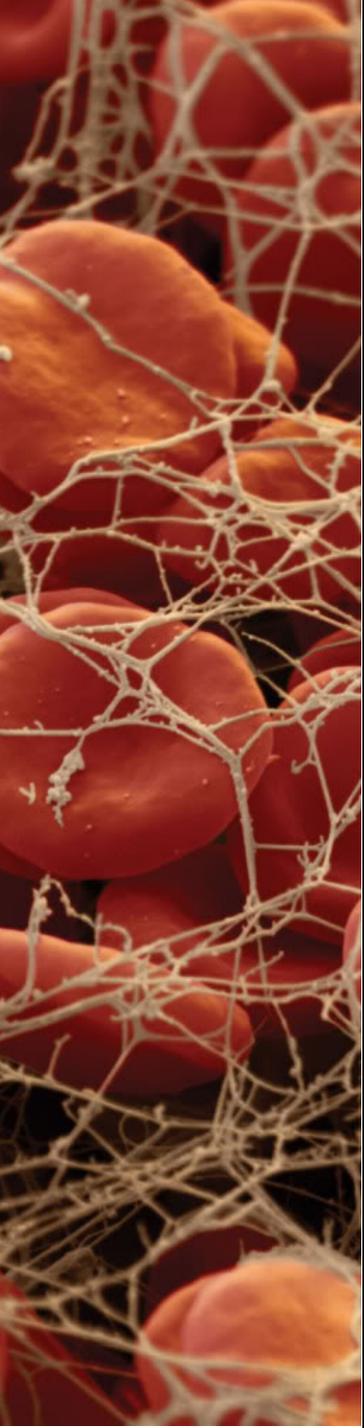
- Institutional Review Board (IRB) approval was obtained from both Union University in Jackson, TN and Phelps County Regional Medical Center in Rolla, MO.
- Identified through PCRMC's electronic medical record (Meditech) and/or VPIMS (Vanderbilt Perioperative Information Medical System) surgical cases involving Total Hip or Total Knee Arthroplasty in which TXA was administered between January 2014 and December 2014.
- Obtained demographic data only such as sex, age, type of procedure, TXA regimen received, preoperative hemoglobin, estimated blood loss during procedure and postoperative hemoglobin levels.
- Ensured that no patient identifiers were obtained such as name, social security numbers nor medical record numbers.
- Statistical analysis was obtained utilizing Statistical Package for the Social Sciences (SPSS) version 21.
- The dependent variable would be TXA administration.
- The independent variable would be hemoglobin levels.

Dosing Regimen

- Total Knee Arthroplasty & Revisions – 1 gm IVPB 10 min prior to incision and repeat 1 gm IVPB at tourniquet release.
- Total Hip Arthroplasty & Revisions- 2 gm IVPB single dose prior to incision.
- To avoid hypotension administration rate was recommended not to exceed 100 mg/min.

Anesthetic



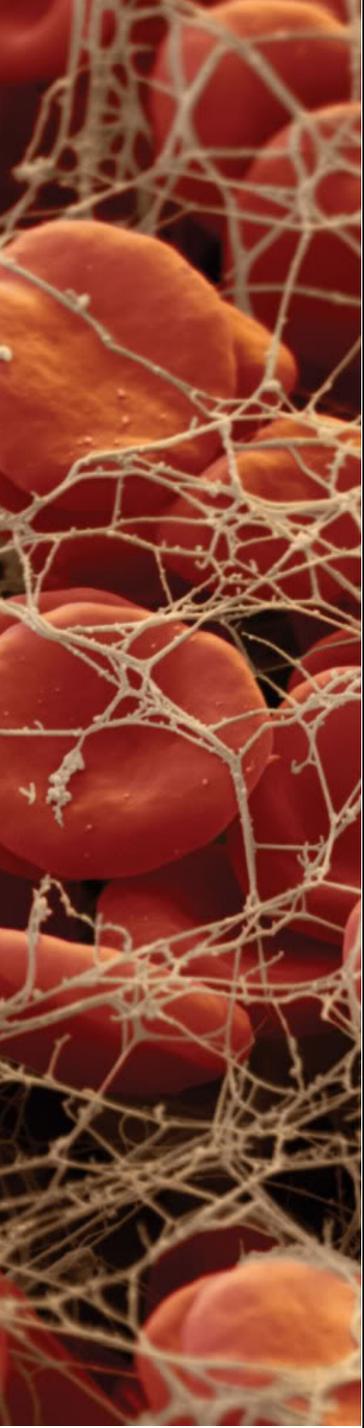


Patient Population

- The total number of cases identified for use in this study was 206 through Meditech and VPIMS. Of these cases, a total of 75 cases were excluded due to set exclusion criteria.
- A total of 131 cases would be included. 83 Total Knee Arthroplasties, 31 Total Hip Arthroplasties, 9 Total Knee Revisions, and 8 Total Hip Revisions.
 - 67% were Female patients while 33% were Male patients. Youngest patient was 28 y/o while oldest patient was 95 y/o.
 - 32.8% or 43 patients received TXA providing 0.83 Power Analysis.

RESULTS

- In the Descriptive Statistics there was definite difference between subjects that received TXA and the group that did not receive TXA on Post-operative days 1, 2 and 3.
- In the Tests of Within-Subjects Effects the Greenhouse-Geisser measurement of Hemoglobin with a significance level of .000 rejects the null hypothesis that hemoglobin levels were equal during postoperative days 1, 2 and 3.
- When we looked at Hgb levels with TXA there was a significance level of .002 which showed an interaction between TXA and Hgb levels which basically meant that TXA affected Hgb levels by maintaining higher Hgb levels as compared to those that did not receive TXA.
- A two-way repeated ANOVA was conducted that examined the effect of TXA between hemoglobin levels for those who received TXA and those that did not. There was a statistically significant interaction between the effects of TXA and hemoglobin levels with a $p = .010$.

A vertical strip on the left side of the slide shows a microscopic view of red blood cells, which are bright red and spherical, surrounded by a complex, white, fibrous network of fibers.

Conclusion

- At PCRMC each unit of PRBC costs ~\$1,096.00 while a two dose regimen of TXA equates to \$34.60 not inclusive of other costs such as supplies, nursing hours, etc.... which translates to ~\$235.60/1000mg vial.
- The continued use of TXA on patients undergoing TKA, THA and Revision surgeries at PCRMC is supported. This is based on statistical analysis, safety profile of TXA along with the patient safety reports found in research literature and economic considerations when compared to the costs associated with blood transfusions in this preliminary retrospective chart review and economic considerations when compared to the costs associated with blood transfusions.
- Which population group do you suppose would this drug benefit in the surgical arena in the interest of cultural diversity and inclusion?
- **Merci Beaucoup, Laissez Les Bons Temp Rouler!**