

Administration of TXA in the prehospital setting Paramedic Mini CAT

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Clinical Scenario:

Paramedics respond to the scene of a single vehicle accident car vs pole. The accident occurs on an 80 series highway in the county approx. 50 min from a lead trauma center. The patient is found semi responsive in the driver seat of the vehicle. On approach of the vehicle you observe the car with significant intrusion into the driver's compartment with airbags deployed. After a rapid extrication and application of a collar you obtain vital signs and perform a primary assessment, you find significant trauma to the torso and no external hemorrhaging, it looks to be from the steering wheel as the patient was unbelted. Vitals – BP 80/40, HR – 120, RR – 24, BGL 6, GCS – 11, ECG – sinus tachycardia. On route the paramedics administer IV fluids, but the patient continues to become more hemodynamically unstable.

Background

Exsanguination remains the leading cause of early mortality in trauma patients and trauma itself has moved up the ranks to the 3rd overall cause of death in the adult population (worldwide). Hemorrhage in these trauma patients is responsible for 30 to 40% of trauma mortality, and of these deaths, 33 to 56% occur during the prehospital period. Improvements in early hemorrhage control and resuscitation and the prevention and aggressive treatment of coagulopathy appear to have the greatest potential to improve outcomes. Recent research has provided us with the data and reasoning that tranexamic acid is beneficial to these trauma patients and given early the better the outcome.

Discovered in 1962, TXA is an FDA approved drug, with a proven safety profile and has an extensive (approximately 40+ years) history. Originally used for dental surgery, post-partum hemorrhage and heavy menstruation. TXA has been included to the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system.

How does it work?

TXA is a medication that has been around for decades and is more commonly used to treat or prevent blood loss from major trauma, postpartum bleeding, surgery, tooth removal, nosebleeds and heavy menstruation. TXA, given IV to trauma patients, has been shown to reduce overall mortality and death due to bleeding among severely injured patients, particularly if administered in the first 3 hours following injury with no dangerous side effects. Classified as an antifibrinolytic and is a competitive inhibitor of plasminogen activation through the formation of a reversible complex displacing plasminogen from fibrin. TXA is metabolized in the liver and excreted by the kidneys. As soon as clots form, the body starts dissolving them, administering TXA inhibits the process of fibrinolysis in addition to the protein breakdown caused by plasmin. Therefore, this mechanism of action helps the body from prematurely breaking down clots as the body forms them.

PICO

In hemodynamically unstable trauma patients does the administration of TXA compared to patients receiving standard care reduce mortality?

Search strategy (Basic): (prehospital) and (TXA) and (mortality) Limit: post 2005

Databases searched: MEDLINE

Search results: 835

Title, author, year	Design/LOE	Population	Intervention	Outcomes	Results	Weaknesses/Strengths
Roberts et al., 2011 CRASH-2	Large randomized placebo-controlled study LOE 1	20,211 trauma patients Hospitals with varying levels of trauma.	Administration of a short course of tranexamic acid on death, vascular occlusive events, and the receipt of blood transfusion in trauma patients	All-cause mortality of the TXA group v. placebo group	TXA significantly decreases mortality rate for bleeding trauma patients (14.5% for TXA compared to 16.0% for placebo) P=.0035	Strength <ul style="list-style-type: none"> • Large Study • Randomized study • Placebo used Weakness <ul style="list-style-type: none"> • No prehospital branch of study
Morrisson et al. 2012 MATTERs	Retrospective observational study LOE 2	896 trauma patients Military surgical hospital in southern Afghanistan	Comparing TXA administration with no TXA in patients receiving at least 1 unit of packed red blood cells	Mortality at 24 hours, 48 hours, and 30 days as well as the influence of TXA administration on postoperative coagulopathy and the rate of thromboembolic complications.	The TXA group had a significantly lower unadjusted mortality than the non -TXA group 17.4% vs 23.9%, P=.03	Weakness <ul style="list-style-type: none"> • No evidence of prehospital use of TXA • Retrospective study

<p>Neeki et al. 2017 CAL-PAT</p>	<p>Non-Randomized Interventional Clinical Trial</p> <p>LOE 2</p>	<p>253 trauma patients</p> <p>Prehospital</p>	<p>First responders administered 1gram of TXA followed by an optional second one-gram dose upon arrival to the hospital, if the patient still met inclusion criteria</p>	<p>24-hour, 48 hour and 28-day mortality rate for patients administered TXA or receiving standard care</p>	<p>TXA administration may be safe in the prehospital setting with no significant change in adverse events observed. 24 hour mortality (3.9% TXA vs 7.2%) P=.27 48- hour mortality rate (6.3% TXA vs 7.2%)P=.76, and 28-day mortality rate (6.3% TXA vs 10.4%)P=.23 – There was no significant difference observed between standard care and care with TXA but this also mean TXA does not increase mortality.</p>	<p>Strength</p> <ul style="list-style-type: none"> • Prehospital study • Recorded doses of TXA given and when <p>Weakness</p> <ul style="list-style-type: none"> • Small sample size
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Comments:

Multiple studies have all pointed to the safe and beneficial administration of TXA in the traumatic/hemorrhagic shock patients. The studies performed in hospital are significant with outcomes that lower the mortality rate of the patients, but studies in the prehospital setting are less significant as they have smaller populations. Although the outcomes are promising and preliminary data shows the use of TXA beneficial, it is our opinion that a large prehospital study needs to be performed.

Considerations:

Initial research indicates that TXA may be a valuable addition to the prehospital trauma setting. Currently, highest levels of evidence supporting the benefit of TXA use in trauma patients has occurred in hospital settings. In order to translate this knowledge into the prehospital/paramedicine setting large RCTs would be useful. Further research is also required to consider increased risk of vascular occlusion such as MI, stroke, DVT, or PE, cost of training, cost of medication, and delaying time to definitive care when used in the prehospital setting. We would not recommend the change of current practice without the completion of a study that is in the prehospital setting, a larger patient count and a positive outcome.

Clinical bottom line:

Pre-hospital TXA should be trialed and then considered in all paramedic services rural and urban due to its success rate, cost efficiency and ease of administration.

References

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