Tranexamic Acid Administered at Time of Hospital Admission Does Not Decrease Transfusion Rates or Blood Loss for Extracapsular Hip Fractures: A Double-Blinded Randomized Clinical Trial

Aaron Owen, Chelsea Boe, Alexandra Cancio-Bello, Nicolas Phillip Kuttner, Kristina Colbenson, Krystin Hidden[1], Jonathan D Barlow[1], William Wood Cross[1], Stephen A Sems[1], Brandon J Yuan[1]
[1]Mayo Clinic

INTRODUCTION:
Extracapsular peritrochanteric hip fractures (AO/OTA 31-A) are common injuries in the elderly trauma population. Tranexamic acid (TXA) has demonstrated efficacy in the management of blood loss perioperatively in hip fracture surgery and has demonstrated benefits if given upon hospital admission in the trauma population at large. As peritrochanteric fractures are outside of the hip capsule, much of the blood loss may be "hidden" and occur in the early period of time after fracture, but prior to surgery.
The aim of the present study was to evaluate the efficacy of TXA when administered immediately upon hospital presentation in patients with AO/OTA 31-A fracture patterns to determine its effect on 1) transfusion rates, 2) estimated blood loss, and 3) postoperative complications.
METHODS: A prospective, double-blinded, randomized clinical trial was performed from 2018 – 2022. A total of 129 patients with AO/OTA 31-A fractures were included: 64 patients were randomized to intravenous (IV) TXA and 65 patients to placebo (IV normal saline). Study drug was administered in the emergency department at time of presentation according to a protocol previously published in the CRASH-2 trial (1-gram bolus over 10 minutes followed by a 1-gram infusion over 8 hours). Perioperative TXA was not administered in either cohort. The mean age was 79 years, 71% were female, and mean body mass index was 26 kg/m^2. The primary outcome was the rate of red blood cell (RBC) transfusion hospital day #0 – #3. Secondary outcomes included estimated blood loss (as determined by hemoglobin balance method) and complications including venous thromboembolic events, stroke, myocardial infarction, all-cause 90-day readmissions, and death. Patients were followed for 6 months following the index surgery. Continuous variables were analyzed using Student's t-test and categorical variables using Chi-squared test.
RESULTS: There was no difference in the rate of RBC transfusion between treatment arms between hospital day #0 – #3 (27% in TXA arm vs. 29% in placebo arm, p=0.74). Patients randomized to placebo that required transfusion required a mean of 2.16 units compared to 1.59 in the TXA cohort (p=0.28). There was no difference in the estimated blood loss as calculated by the hemoglobin balance method between hospital day #0 – #3. There was no difference in the incidence of postoperative complications including deep vein thrombosis, pulmonary embolism, stroke, myocardial infarction, 90-day readmission, or death.
DISCUSSION AND CONCLUSION: The current study did not demonstrate a decrease in the need for RBC transfusion when administering TXA at time of presentation for patients with extracapsular hip fractures. Importantly, there was no increased rate of complications in the TXA cohort suggesting early administration is safe. The results of the current study do not support the use of preoperative IV TXA for reducing "hidden" blood loss for geriatric patients with extracapsular hip fractures.

Table 1. Patient Demographics

Variable	TXA (N=64)	Placebo (N=65)	p-value
Age, mean (SD)	79.094 (13.448)	79.692 (12.720)	0.795
Female, No. (%)	45 (70.3%)	46 (70.8%)	0.955
BMI, mean (SD)	25.21 (5.12)	27.40 (7.89)	0.064
Days from Admit to Surgery, No. (%)			0.194
0	3 (4.7%)	9 (13.8%)	
1	57 (89.1%)	53 (81.5%)	
2	4 (6.2%)	3 (4.6%)	

Table 2. Blood transfusions and Estimated Blood Loss

Variable	TXA (N=64)	Placebo (N=65)	p value
EBL by hospital day, mean (SD)			
Hospital Day 0	0.72 (0.59)	0.86 (0.68)	0.34
Hospital Day 1	0.80 (0.51)	0.92 (0.76)	0.323
Hospital Day 2	0.29 (0.43)	0.27 (0.46)	0.876
Hospital Day 3	0.08 (0.36)	0.11 (0.32)	0.728
Cumulative EBL, mean (SD)			
Hospital Day 0	0.719 (0.585)	0.858 (0.680)	0.34
Hospital Day 0 - 1	1.144 (0.728)	1.409 (1.086)	0.108
Hospital Day 0 - 2	1.35 (0.88)	1.59 (1.22)	0.215
Hospital Day 0 - 3	1.40 (1.01)	1.65 (1.20)	0.205
RBC Transfusion by hospital day, No. (%)			
Hospital Day 0			0.55
No	62 (96.9%)	64 (98.5%)	
Yes	2 (3.1%)	1 (1.5%)	
Hospital Day 1			0.152
No	60 (93.8%)	56 (86.2%)	
Yes	4 (6.2%)	9 (13.8%)	
Hospital Day 2			0.636
No	56 (87.5%)	55 (84.6%)	
Yes	8 (12.5%)	10 (15.4%)	
Hospital Day 3			0.975
No	57 (89.1%)	58 (89.2%)	
Yes	7 (10.9%)	7 (10.8%)	
Cumulative RBC Transfusion, No. (%)			
Hospital Day 0			0.55
No	62 (96.9%)	64 (98.5%)	
Yes	2 (3.1%)	1 (1.5%)	
Hospital Day 0 -1			0.428
No	58 (90.6%)	56 (86.2%)	
Yes	6 (9.4%)	9 (13.8%)	
Hospital Day 0 -2			0.404
No	53 (82.8%)	50 (76.9%)	
Yes	11 (17.2%)	15 (23.1%)	
Hospital Day 0 -3			0.736
No	47 (73.4%)	46 (70.8%)	
Yes	17 (26.6%)	19 (29.2%)	

Table 3. Postoperative complications

Outcome	TXA (N=64)	Placebo (N=65)	p-value
DVT, No. (%)			0.302
No	61 (95.3%)	64 (98.5%)	
Yes	3 (4.7%)	1 (1.5%)	
PE, No. (%)			0.312
No	63 (98.4%)	65 (100.0%)	
Yes	1 (1.6%)	0 (0.0%)	
MI, No. (%)			0.157
No	64 (100.0%)	63 (96.9%)	
Yes	0 (0.0%)	2 (3.1%)	
Stroke, No. (%)			0.082
No	64 (100.0%)	62 (95.4%)	
Yes	0 (0.0%)	3 (4.6%)	
Death, No. (%)			0.747
No	57 (89.1%)	59 (90.8%)	
Yes	7 (10.9%)	6 (9.2%)	
Wound Complication, No. (%)			0.166
No	60 (93.8%)	64 (98.5%)	
Yes	4 (6.2%)	1 (1.5%)	
Readmission 90-day, No. (%)			0.97
No	54 (84.4%)	55 (84.6%)	
Yes	10 (15.6%)	10 (15.4%)	

* TXA = tranexamic acid; DVT = deep vein thrombosis; PE = pulmonary embolism; MI = myocardial infarction