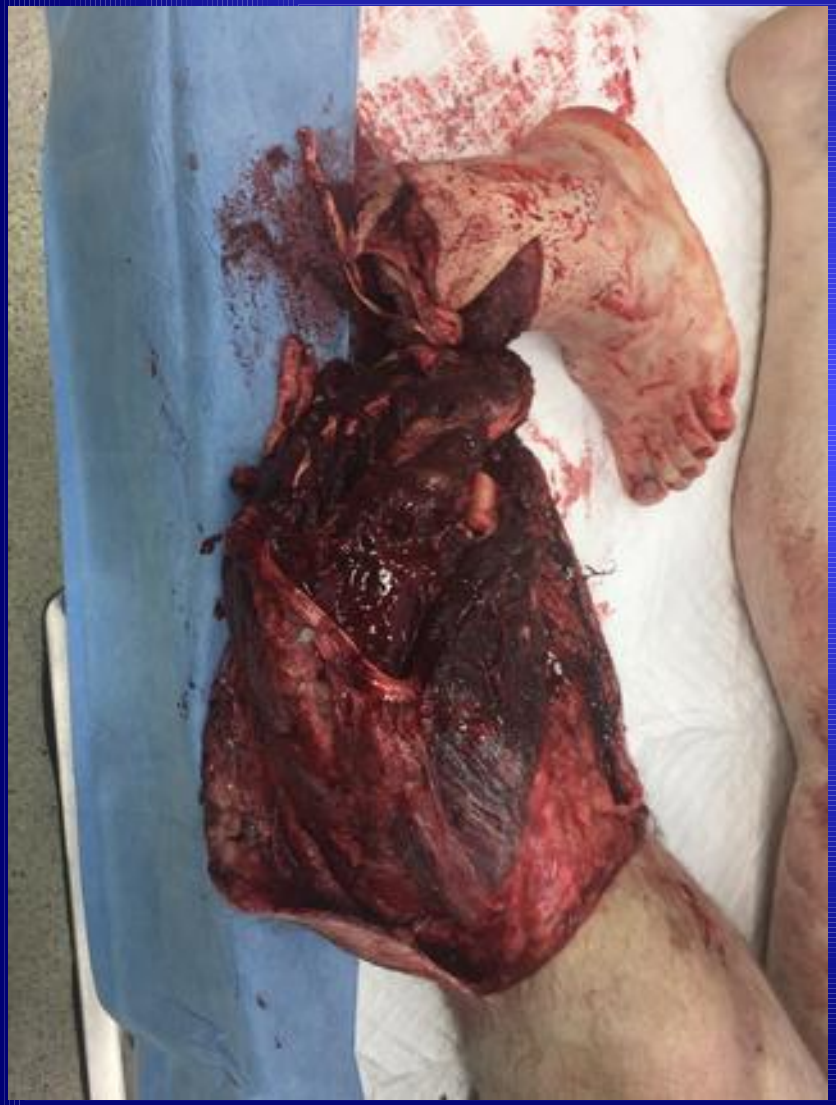
Je správná mandatorní aplikace TXA u polytraumat?

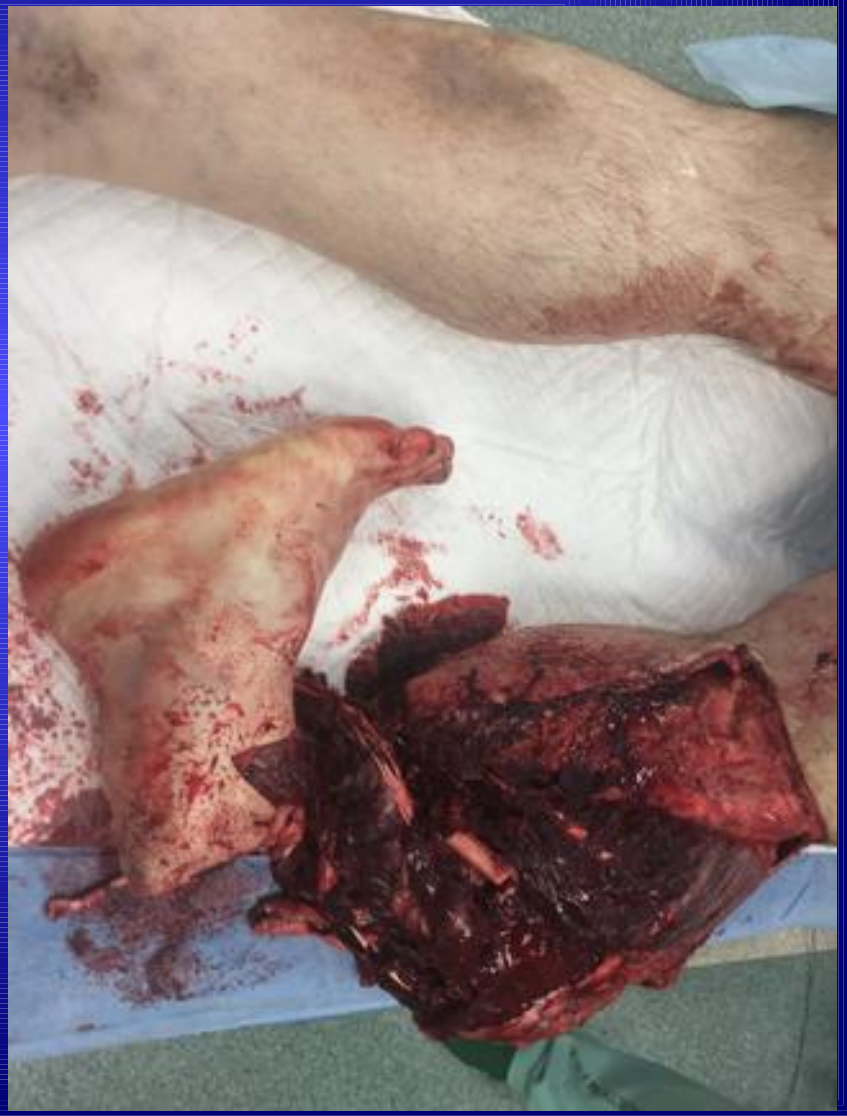
Jaromír Kočí

Oddělení urgentní medicíny

FN Hradec Králové

Dostal tento pacient TXA?



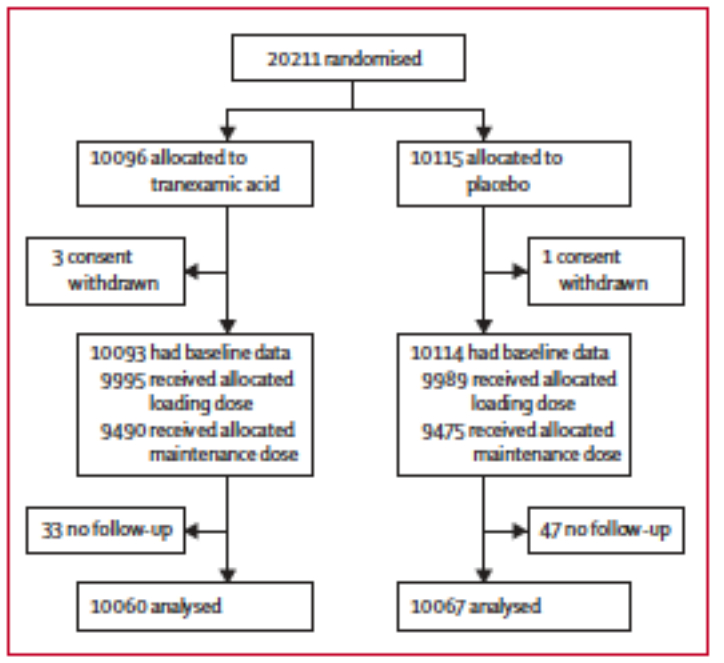



Jestli ten Exacyl nedáš,
tak si u mě mrtvej
Homolka!!!

CRASH-2 trial

Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial

Lancet 2010; 376: 23-32



Adult trauma patients with significant haemorrhage (systolic blood pressure <90 mm Hg or heart rate >110 beats per min, or both), or who were considered to be at risk of significant haemorrhage, and who were within 8 h of injury, were eligible for the trial. Patients

CRASH-2 trial

	Tranexamic acid (n=10 060)	Placebo (n=10 067)	RR (95% CI)	p value (two-sided)
Any cause of death	1463 (14·5%)	1613 (16·0%)	0·91 (0·85–0·97)	0·0035
Bleeding	489 (4·9%)	574 (5·7%)	0·85 (0·76–0·96)	0·0077
Vascular occlusion*	33 (0·3%)	48 (0·5%)	0·69 (0·44–1·07)	0·096
Multiorgan failure	209 (2·1%)	233 (2·3%)	0·90 (0·75–1·08)	0·25
Head injury	603 (6·0%)	621 (6·2%)	0·97 (0·87–1·08)	0·60
Other causes	129 (1·3%)	137 (1·4%)	0·94 (0·74–1·20)	0·63

Data are number (%), unless otherwise indicated. RR=relative risk. * Includes myocardial infarction, stroke, and pulmonary embolism.

Table 2: Death by cause

admission. Finally, fewer deaths occurred in patients allocated to tranexamic acid than to placebo, and the patients who survived as a result of tranexamic acid administration would have had a greater opportunity to receive a blood transfusion (competing risks).

CRASH-2 trial

- ALE…..
  - Pouze 50 % pacientů vyžadovalo operaci
  - Pouze 50 % pacientů vyžadovalo transfúzi

ORIGINAL ARTICLE

ONLINE FIRST

Military Application of Tranexamic Acid in Trauma Emergency Resuscitation (MATTERs) Study

Jonathan J. Morrison, MB ChB, MRCS; Joseph J. Dubose, MD; Todd E. Rasmussen, MD; Mark J. Midwinter, BMedSci, MD, FRCS

Arch Surg. 2012;147(2):113-119. Published online October 17, 2011. doi:10.1001/archsurg.2011.287

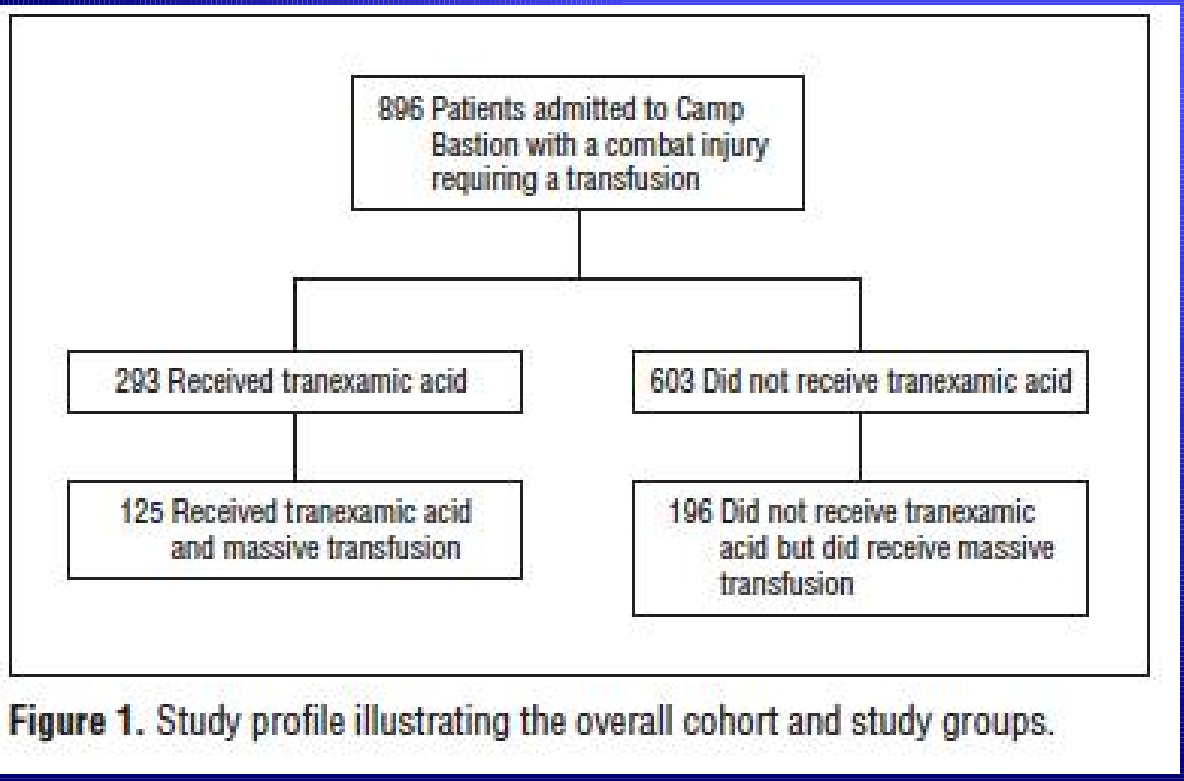
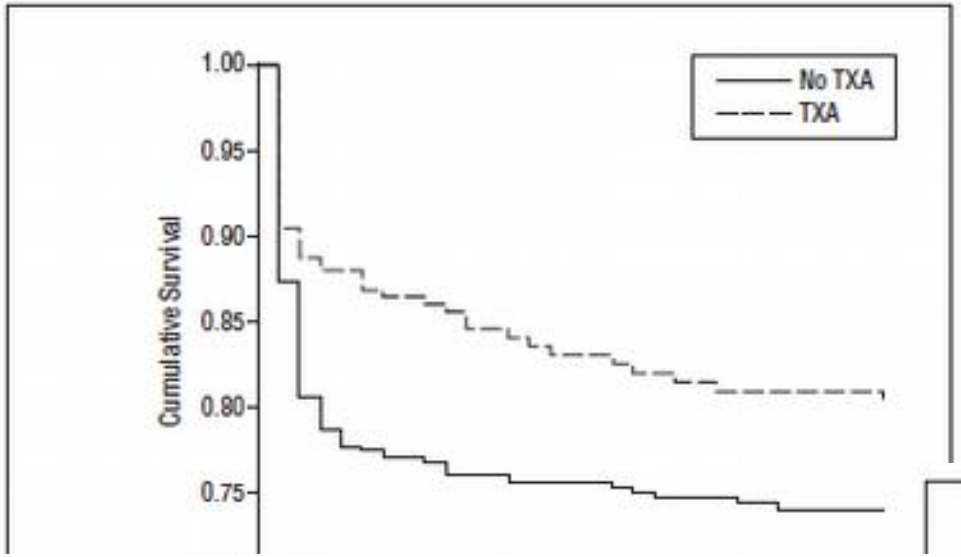


Figure 1. Study profile illustrating the overall cohort and study groups.



No TXA:	603	351	269	246	231	226	218

Figure 3. Kaplan-Meier survival curve of the overall cohort, including patients receiving tranexamic acid (TXA) vs no TXA. *P*=.006, Mantel-Cox log-rank test.

Efekt podání – hypotenze?!!!

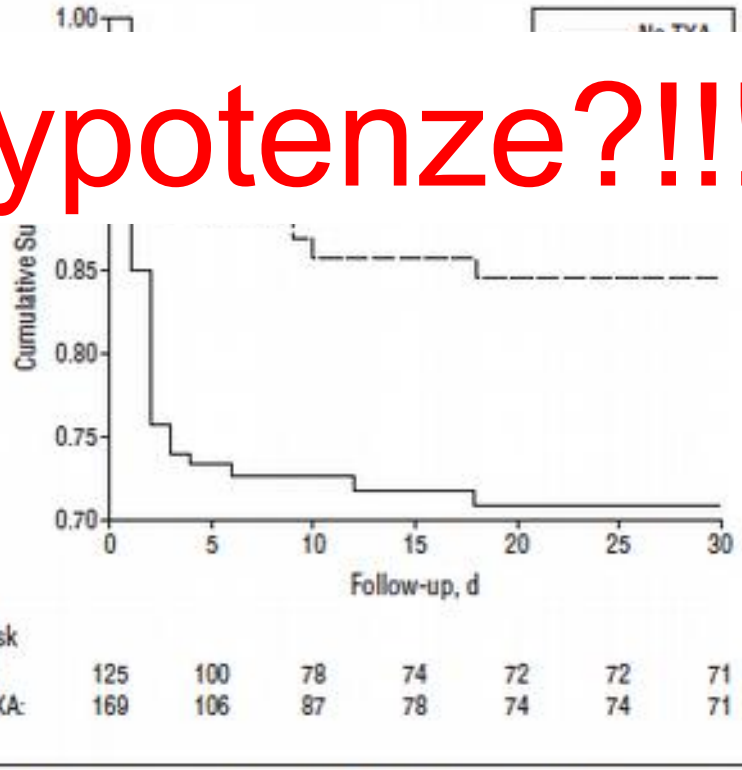


Figure 4. Kaplan-Meier survival curve of the massive transfusion group receiving tranexamic acid (TXA) or no TXA. *P*=.004, Mantel-Cox log-rank test.

Do all trauma patients benefit from tranexamic acid?

Evan J. Valle, MD, Casey J. Allen, MD, Robert M. Van Haren, MD, MSPH, Jassin M. Jouria, MD, Hua Li, MD, PhD, Alan S. Livingstone, MD, Nicholas Namias, MD, MBA, Carl I. Schulman, MD, PhD, *and* **Kenneth G. Proctor, PhD,** *Miami, Florida*

TABLE 1. Comparison of Study Populations

	CRASH-2[1]	Present Study
n	20,211	300
Age	**35 ± 14**	**43 ± 20**
% male	84%	86%
Time since injury, h	**2.8–2.9**	**<1 (est)**
% penetrating	**32%**	**54%**
SBP< 75 mm Hg	**16%**	**35%**
SBP, 76–89 mm Hg	16%	16%
SBP > 90 mm Hg	**68%**	**48%**
Heart rate (HR) < 77 beats/min	**9%**	**24%**
HR, 77–91 beats/min	17%	15%
HR, 92–107 beats/min	25%	19%
HR > 107 beats/min	48%	42%
GCS score, 3–8	**18%**	**32%**
GCS score, 9–12	**13%**	**8%**
GCS score, 13–15	**68%**	**59%**
Mortality	**15%**	**27%**
Blood product transfusion	**50%**	**97%**
Surgical intervention	**48%**	**78%**

TABLE 3. Fluid Requirements and Other Outcomes

	No TXA (n = 150)	TXA (n = 150)	*p*
Emergency resuscitation area			
pRBC, mL	1,000 (1,000)	1,000 (750)	0.284
FFP, mL	920 ± 463	824 (593)	0.340
Crystalloid, mL	1,600 (1,950)	1,125 (1,531)	0.083
Total Fluid, mL	**2,675 (3,505)**	**2,250 (2,275)**	**0.025**
Operating room			
pRBC, mL	**1,500 (1,750)**	**2,250 (3,450)**	**0.002**
FFP, mL	**1,125 (1,250)**	**1,750 (2,500)**	**0.005**
Crystalloid, mL	4,500 (3,025)	4,000 (3,600)	0.605
Total fluid , mL	6,450 (5,100)	7,050 (8,859)	0.092
Estimated blood loss, mL	1,500 (2,413)	1,500 (3,350)	0.582
24-h totals			
pRBC, mL	**1,999 (2,000)**	**2,250 (4,188)**	**0.009**
FFP, mL	1,218 (1,060)	1,684 (2,996)	0.197
Crystalloid, mL	7,663 (5,701)	7,600 (6,137)	0.985
Total fluid, mL	10,675 (8,108)	12,102 (11,663)	0.890
Estimated blood loss, mL	1,450 (3,300)	1,528 (3,883)	0.173
Outcomes			
ICU, d	4 (14)	5 (18)	0.968
LOS, d	13 (28)	13 (24)	0.745
Mortality	23%	31%	0.091
Mortality (excluding DOA)	**17%**	**27%**	**0.024**

Crystalloid, lactated Ringer's or saline.

The impact of tranexamic acid on mortality in injured patients with hyperfibrinolysis

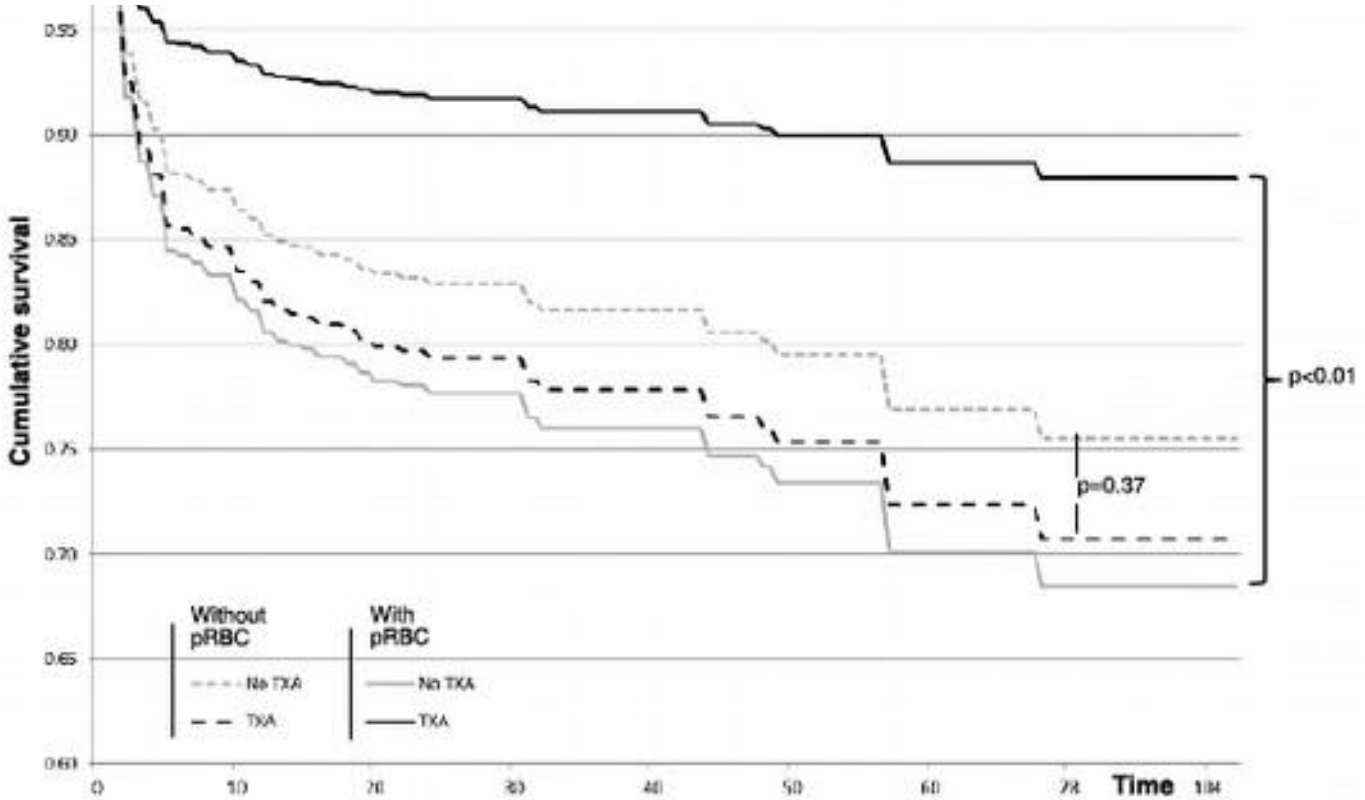
John A. Harvin, MD, Charles A. Peirce, Mark M. Mims, Jessica A. Hudson, MD, Jeanette M. Podbielski, RN, Charles E. Wade, PhD, John B. Holcomb, MD, *and* Bryan A. Cotton, MD, MPH, *Houston, Texas*

CONCLUSION

The administration of TXA in trauma patients with known HF was associated with increased 24-hour morality but no difference in in-hospital mortality after adjusting for severity of injury, age, and sex. While far from a definitive study,

Tranexamic acid in severe trauma patients managed in a mature trauma care system

Mathieu Boutonnet, MD, Paer Abback, MD, Frédéric Le Saché, MD, Anatole Harrois, MD, PhD, Arnaud Follin, MD, Nicolas Imbert, MD, Andrew P. Cap, MD, PhD, Julie Trichereau, Msc, Sylvain Ausset, MD, *and* **the Traumabase Group,** *Clamart Cedex, France*



Tranexamic acid administration is associated with an increased risk of posttraumatic venous thromboembolism

Sara P. Myers, MD, Matthew E. Kutcher, MD, Matthew R. Rosengart, MD, Jason L. Sperry, MD, Andrew B. Peitzman, MD, Joshua B. Brown, MD, *and* **Matthew D. Neal, MD,** *Pittsburgh, PA*

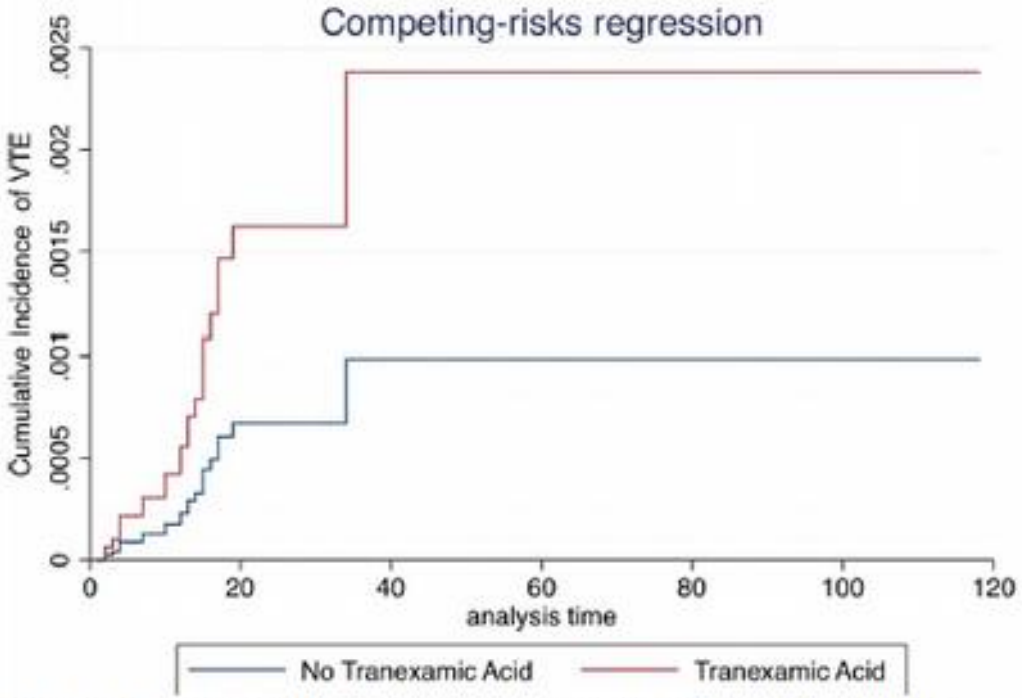
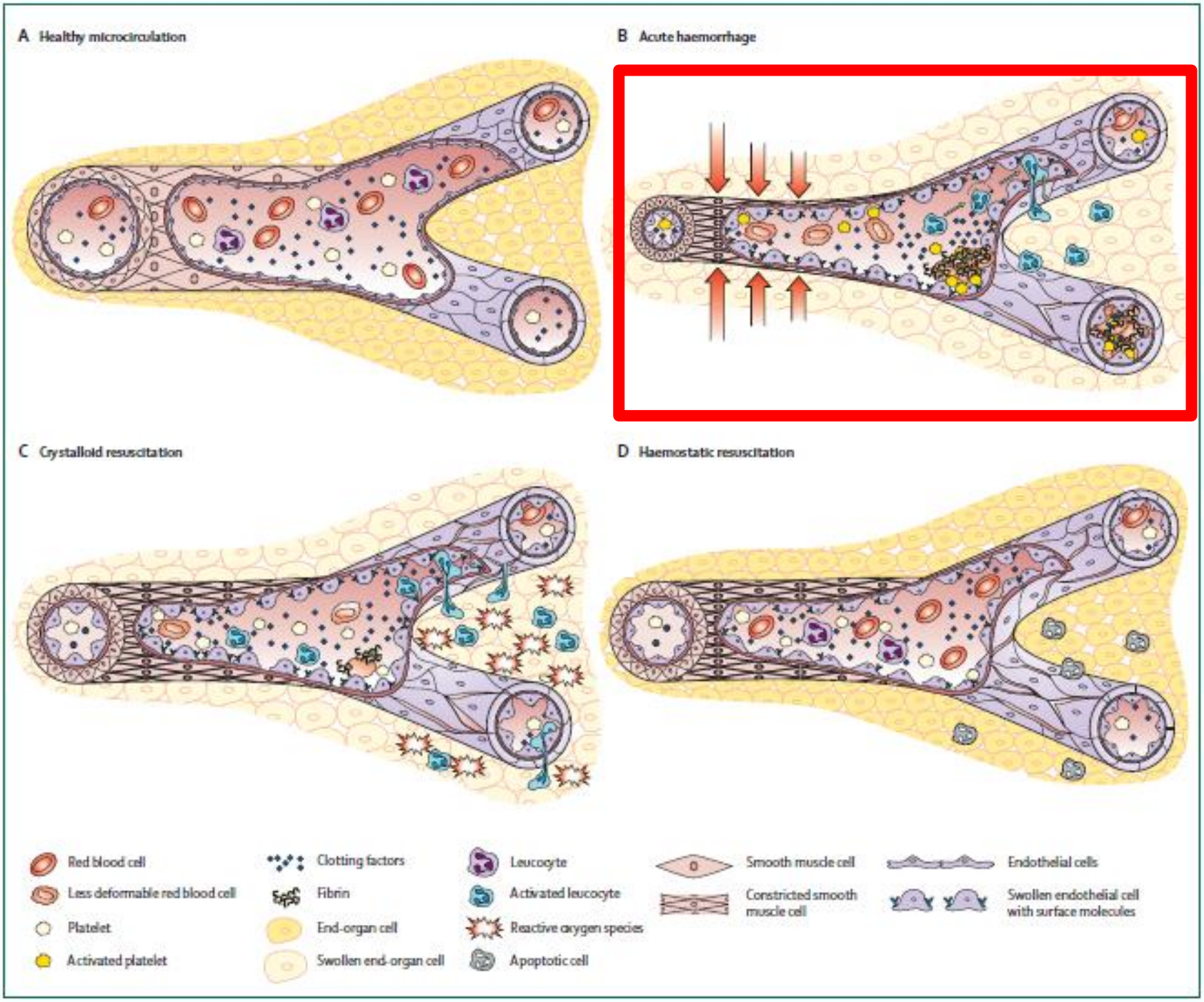


Figure 3. Cumulative incidence of venous thromboembolic events among patients who received TXA compared with those who did not using a competing-risks regression model.


A Healthy microcirculation
B Acute haemorrhage
C Crystalloid resuscitation
D Haemostatic resuscitation
Red blood cell
Less deformable red blood cell
Platelet
Activated platelet
Clotting factors
Fibrin
End-organ cell
Swollen end-organ cell
Leucocyte
Activated leucocyte
Reactive oxygen species
Apoptotic cell
Smooth muscle cell
Constricted smooth muscle cell
Endothelial cells
Swollen endothelial cell with surface molecules

Acute Fibrinolysis Shutdown after Injury Occurs Frequently and Increases Mortality: A Multicenter Evaluation of 2,540 Severely Injured Patients

Hunter B Moore, MD, Ernest E Moore, MD, FACS, Ioannis N Liras, MD, Eduardo Gonzalez, MD, John A Harvin, FACS, MD, John B Holcomb, MD, FACS, Angela Sauaia, MD, PhD, Bryan A Cotton, MD, MPH, FACS

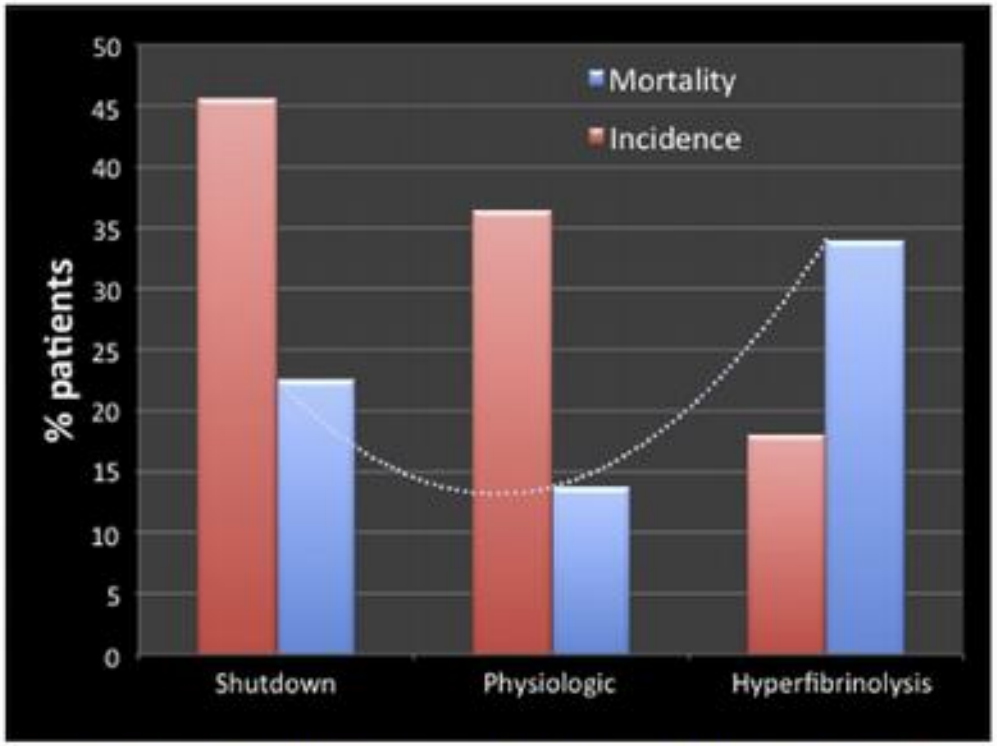


Figure 1. Incidence and mortality of severely injured trauma patients stratified by fibrinolysis phenotype.

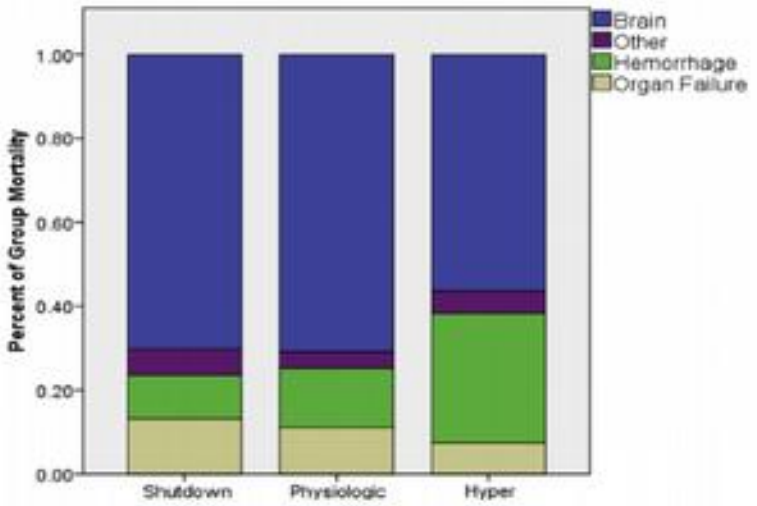
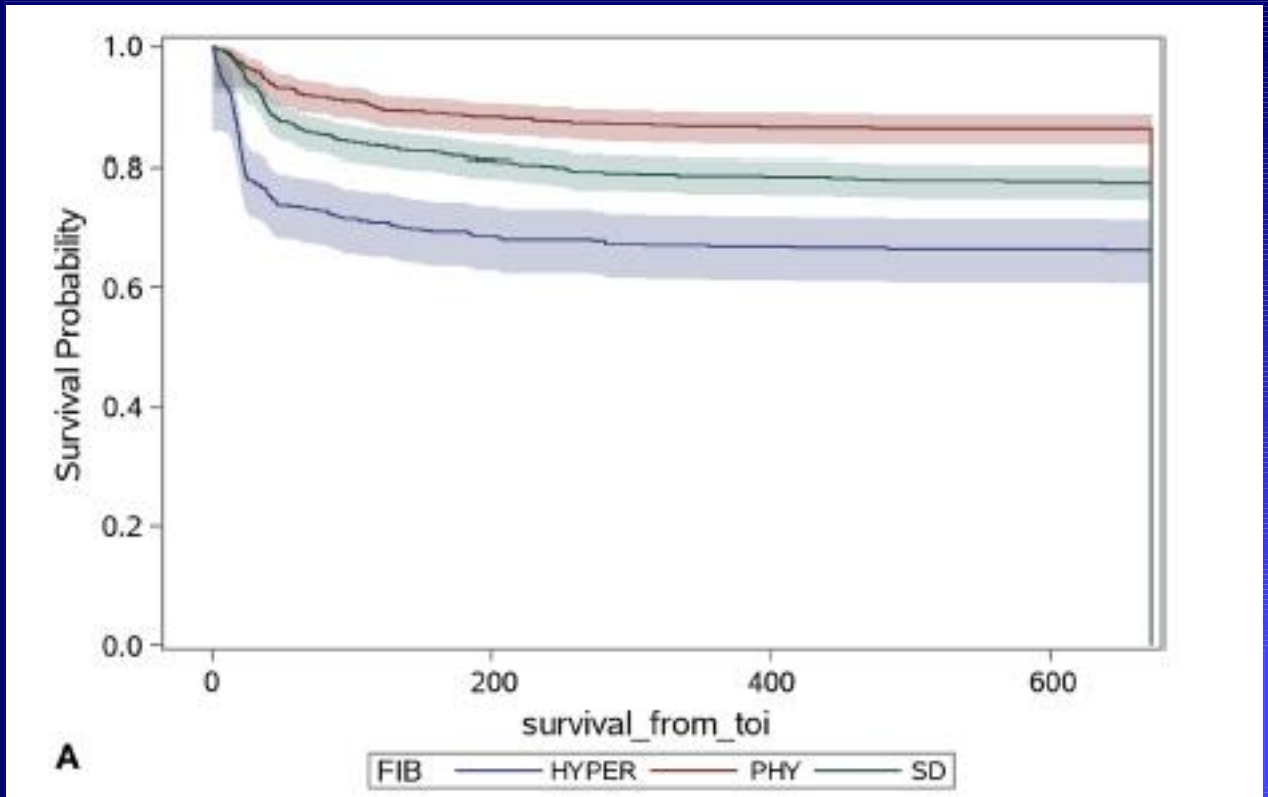


Figure 3. Differences in causes of mortality between phenotypes.



using rapid TEG. Appreciation that fibrinolysis shutdown is the most common phenotype after severe injury warrants careful reconsideration of the empiric use of antifibrinolytics in trauma, and suggests a mechanism for the failure to document improved survival with the use of tranexamic acid in recent studies.

Section Editor: Roman M. Sniecinski

Harmful or Physiologic: Diagnosing Fibrinolysis Shutdown in a Trauma Cohort With Rotational Thromboelastometry

J. Carolina Gomez-Builes, MD,*† Sergio A. Acuna, MD, PhD,‡§‖ Bartolomeu Nascimento, MD, MSc,‖¶ Fabiana Madotto, PhD,# and Sandro B. Rizoli, MD, PhD, FRCP*†‡‖

Table 1. Clinical Characteristics According to Fibrinolysis Groups

	Physiologic ML, 3%–15%; n = 389 (70.7%)	Shutdown ML, <3%; n = 141 (25.6%)	Hyperfibrinolysis ML, >15%; n = 20 (3.6%)	All Patients; N = 550
Age (y)	42 (27, 58)	45 (30, 62)	36 (21.5, 69)	43 (27, 60)
ISS, points	17 (13, 24)	22 (16, 29)	26 (19, 36.5)	19 (14, 26)
ISS >16 points	248 (63.7)	111 (78.7)	16 (80)	375 (68.1)
Male	280 (72)	104 (73.8)	17 (85)	401 (72.9)
Penetrating injury	55 (14.1)	16 (11.3)	6 (30)	77 (14)
AIS score head >2	154 (39.6)	60 (42.6)	12 (60)	226 (41.1)
Temperature (°C)	36 (35.2, 36.6)	35.5 (34.9, 36.3)	35.00 (34.48, 36.4)	35.9 (35, 36.6)
SBP at hospital admission (mm Hg)	132 (120, 147)	130 (111, 140)	121.5 (93.7, 131.7)	130 (117, 145)
Base excess (mEq/L)	−1.7 (−4, 0.3)	−4.1 (−7.2, −0.8)	−8.15 (−13.3, −1.22)	−2.20 (−5.3, 0)
Transfusion in 24 h	69 (17.7)	56 (39.7)	12 (60)	137 (24.9)
Massive transfusion	7 (1.8)	15 (10.6)	7 (35)	29 (5.3)
TXA in hospital	97 (25.1)	36 (25.7)	13 (65)	146 (26.7)
Prehospital TXA	47 (12)	26 (18.4)	0	73 (13.2)
Thrombotic events	11 (2.8)	6 (4.3)	0	17 (3.1)
LOS in hospital (d)	[illegible]	[illegible]	[illegible]	[illegible]
Mortality	25 (6.4)	18 (12.8)	11 (55)	54 (9.8)

CONCLUSIONS: Despite higher injury burden, evidence of shock, and greater need for blood transfusions, early fibrinolysis shutdown was not associated with mortality, suggesting that it could represent an adaptive physiologic response to life-threatening trauma. (Anesth Analg 2018;127:840–9)

Nepřímý efekt TXA

- Větší cílení na DCR
- Větší cílení na rychlou diagnostiku krvácení a poruch koagulace

Pro jaké pacienty je tedy TXA vhodná?

Pro jaké pacienty je tedy TXA vhodná?

- Systolický tlak pod 75 mmHg
- Středně těžké TBI (GCS 9-12)
- Penetrující TBI

Pro jaké pacienty je tedy TXA vhodná?

- Vždy TEG/ROTEM
- Do 3 hodin po úrazu
- Vždy prokázané krvácení!

ALE HLAVNĚ....

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