

Hemostatická monitorace a jak to dělám já

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Hemostatická monitorace

- dynamická povaha závažného krvácení vyžaduje rychlou diagnostiku následovanou optimálně vedenou hemosubstituční terapií
- hemostatická monitorace hraje v managementu ŽOK klíčovou roli

Hemostatická monitorace

Cílem hemostatické monitorace je:

- časný záchyt koagulační poruchy
- posouzení podílu jednotlivých složek hemostázy na přítomné koagulopatii
 - koagulačních faktorů, fibrinogenu, trombocytů, tvorby a stability koagula a fibrinolýz
- zhodnocení vlivu antikoagulační a antiagregační léčby na stav koagulace
- individualizovaná hemosubstituční terapie pacienta
- kontrola odpovědi na léčbu v reálném čase a případnou úpravu dalšího terapeutického postupu.

Patient blood management (PBM) and PBM-related guidelines, guidance, consensus statements and recommendations by specialty and/or clinical settings



1. Peri-operative

Patient blood management guidelines: module 2 – Perioperative. National Blood Authority, 2012 (1)
Management of severe perioperative bleeding: Guidelines from the European Society of Anaesthesiology and Intensive Care: Second update, 2023 (2)
EACTS/EACTA Guidelines on patient blood management for adult cardiac surgery, 2017 (3)
STS/SCA/AmSECT/SABM Update to the clinical practice guidelines on patient blood management, 2021 (4)
2022 ESC Guidelines on cardiovascular assessment and management of patients undergoing non-cardiac surgery (5)
Recommendations from the International Consensus Conference on Anemia Management in Surgical Patients (ICCAMS), 2022 (6) (7)
Centre for Perioperative Care, 2022 (8)
Identification and management of preoperative anaemia in adults: A British Society for Haematology Guideline update, 2024 (9)
Management of peri-surgical anemia in elective surgery. Conclusions and recommendations according to Delphi-UCLA methodology, 2024 (10)

3. Intensive care/

Patient blood management guidelines: module 4 – critical care. National Blood Authority, 2012 (16)

4. Obstetrics and gynaecology

Patient blood management guidelines: module 5 – obstetrics. National Blood Authority, 2015 (17)
A roadmap to combat postpartum haemorrhage between 2023 and 2030. Geneva: World Health Organization, 2023 (18)
Patient blood management in obstetrics: management of anaemia and haematinic deficiencies in pregnancy and in the postpartum period: NATA consensus statement, 2018 (19)
Patient blood management in obstetrics: prevention and treatment of postpartum haemorrhage. A NATA consensus statement, 2019 (20)
UK guidelines on the management of iron deficiency in pregnancy, 2020 (21)
Accelerating anaemia reduction: a comprehensive framework for action, WHO, 2023 (22)
SABM administrative and clinical standards for patient blood management programs, 4th edition, 2017 (23)

5. Neonatology and paediatrics

Patient blood management guidelines: module 6 – neonatal and paediatrics. National Blood Authority, 2017 (24)
Patient blood management for neonates and children undergoing cardiac surgery: 2019 NATA Guidelines (25)
Society for the advancement of blood management administrative and clinical standards for patient blood management programmes (pediatric version), 2019 (26)
Management of severe peri-operative bleeding: Guidelines from the European Society of Anaesthesiology and Intensive Care: Second update 2022 (27)
Accelerating anaemia reduction: a comprehensive framework for action, WHO, 2023 (22)

6. Massive haemorrhage

The European guideline on management of major bleeding and coagulopathy following trauma: sixth edition 2023 (28)
Management of severe perioperative bleeding: Guidelines from the European Society of Anaesthesiology and Intensive Care: Second update, 2023 (2)

Recommendation 11

We recommend the early and repeated monitoring of haemostasis, using either a traditional laboratory determination such as prothrombin time (PT)/international normalised ratio (INR), Clauss fibrinogen level and platelet count *and/or* point-of-care (POC) PT/INR and/or a viscoelastic method (Grade 1C).

DIAGNOSTIKA A LÉČBA
PERIPARTÁLNÍHO ŽIVOT
OHROŽUJÍCÍHO KRVÁCENÍ
Česko-slovenský mezioborový konsenzus
Doporučený postup

Doporučení 26

K identifikaci typu koagulační poruchy u PŽOK a k její monitoraci doporučujeme kromě výše uvedených standardních a opakovaně prováděných vyšetření (KO, aPTT, PT, fibrinogen) *používat i* viskoelastometrické metody (ROTEM, TEG), jsou-li dostupné.

Research Article

Are We Overusing Coagulation Studies in the Emergency Department?

Bader Alyahya¹,¹ Abdulaziz Alalshaikh,¹ Ali Alkhulaif,² Tareq Al-Salamah,¹ Badr Aldawood,¹ Alwaleed Alsubaie,³ Meshal Alohalil,⁴ Saud Alshenaifi,⁵ Abdulaziz Alohalil,⁵ Majed B. Alzin,⁵ Abdullah Almana,⁵ Mohammed Habib,⁵ and Rana Hasanato⁶

1,754 patients were included in the study. Coagulation profile testing consists of prothrombin time (PT), partial thromboplastin time (PTT), and international normalized ratio (INR) . 1,051 tests **(59.9%) were not indicated and were unnecessary**. The expected annual cost saving if the unnecessary tests were removed would be around SAR 1,897,200 (approximately US\$ 503,232)

Conclusion

This study showed that coagulation tests are overused in the ED. More than half of coagulation profile tests in our study population were deemed unnecessary and associated with significant cost. Targeted testing based on specific patient presentation and medical history can guide physicians in wisely choosing who needs coagulation studies.

Several studies have suggested that routine coagulation profile assessment does not impact the clinical management in the ED

Standardní laboratorní testy (SLTs)

PT, aPTT a TT

- určují pouze rychlost tvorby ale ne mechanickou pevnost koagula
- jsou vynikající pro detekci kongenitálních i získaných forem haemophilie
- detekce antikoagulace heparinem (falešně prodloužený PT a aPTT v případě hypo/afibrinogenemie)
- nejsou designovány pro akutní ŽOK

INR

- vyvinut k monitoraci terapie warfarinem (nemá výpovědní hodnotu o akutním koagulačním stavu)

fibrinogen

- metoda podle Claussa není zcela standardizováno (odchyly v kalibraci, různorodost reagensů..)
- vyšetření kvantitativní ne kvalitativní

počet destiček

- vyšetření kvantitativní ne kvalitativní



***Perioperative Haemostatic Monitoring:
older vs. newer concepts and techniques***

Katsanoulas K MD, Zemou S MD, Tzima M MD, MsC, Katsika E MD, PhD.

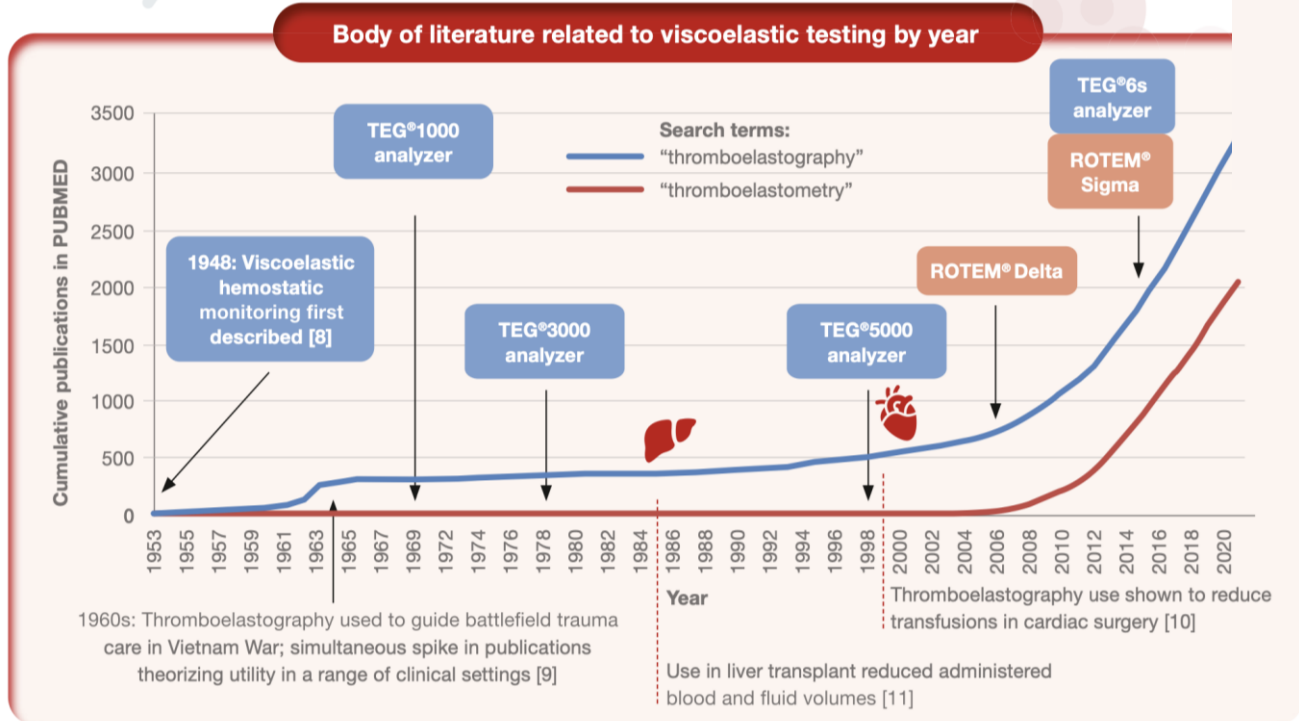
- Traditional coagulopathy monitoring using bleeding times offers very little in prediction and guidance during severe bleeding.
- They are mostly designed for stable patients under anticoagulant treatments
- There is no information on clot formation over time and no hyperfibrinolysis detection.
- Long turnaround times (40 - 90 min) which delay results

For all these reasons the **ESAIC Guidelines 2022** recommend the use of standardised questionnaires on bleeding and drug history as preferable to the routine use of conventional coagulation screening tests such as aPTT, INR and platelet count in elective surgery.

Coagulation tests – timing?

■ PT	} > 45 min	
■ aPTT		
■ Fibrinogen		
		88 minutes (range: 29–235 min)
		Toulon, Thromb Haemost 2009
		78 minutes (range: 62–103 min)
		Davenport, CCM 2011

Viskoelastické testy



Hartmann J, Hermelin D, Levy JH. Viscoelastic testing: an illustrated review of technology and clinical applications. Res Pract Thromb Haemost. 2022 Dec 27;7(1):100031. doi: 10.1016/j.rpth.2022.100031. PMID: 36760779; PMCID: PMC9903681.



Cardiothoracic and vascular surgery

- Presurgical platelet function tests
- Peri-operative hemostasis testing
- Intensive care unit management



Liver disease and transplant

- Patients with cirrhosis undergoing invasive procedures
- Patients with cirrhosis experiencing active bleeding
- Liver transplant surgery



Trauma and emergency

- Trauma-induced coagulopathy
- Traumatic brain injury and associated coagulopathy



Gynecologic and obstetric care

- Management of postpartum hemorrhage
- Identifying hypercoagulability as a potential cause for miscarriage



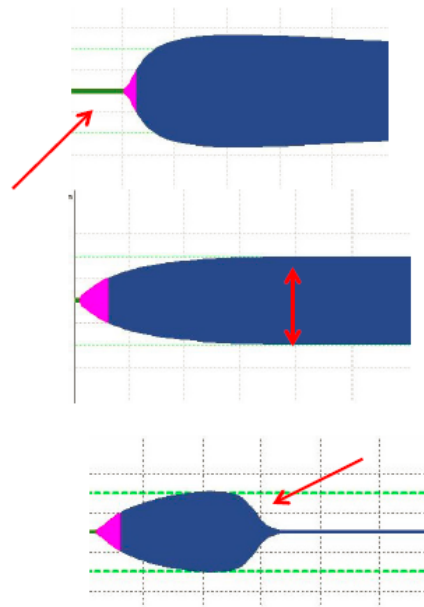
Critical care

- Management of clinical conditions associated with coagulopathy and thrombotic complications e.g., hemorrhage, mechanical support, sepsis and COVID-19

Viscoelastic Tests - ROTEM®/TEG®

Fast assessment of the individual coagulation status in whole blood

- **Initiation process of coagulation**
- **Clot strength**
- **Clot stability**



Point-of-care (POC) testing

Viscoelastic testing (e.g., ROTEM®), a POC test, provides **rapid, whole blood coagulation assessment**, including clot formation/strength and fibrinolysis³



- A retrospective study investigating ROTEM® tests concluded that **FIBTEM A10/MCF provided early predictive information for massive transfusion** in trauma patients⁴
- Compared with standard coagulation tests, **use of viscoelastic testing to guide hemostatic resuscitation** in patients with severe injuries is associated with:⁵
 - **Increased proportion of patients alive and free of massive transfusion at 24 hours**
 - **Reduction in the use of blood products and related costs**

RESEARCH

Open Access

Thromboelastometry-guided haemostatic resuscitation in severely injured patients: a propensity score-matched study

Jean-Stéphane David^{1,2*}, Arthur James³, Maxime Orion¹, Agathe Selves³, Mélody Bonnet¹, Pauline Glasman³, Charles-Hervé Vacheron^{1,4,5} and Mathieu Raux⁶



Abstract

Background To accelerate the diagnosis and treatment of trauma-induced coagulopathy (TIC), viscoelastic haemostatic assays (VHA) are increasingly used worldwide, although their value is still debated, with a recent randomised trial showing no improvement in outcome. The objective of this retrospective study was to compare 2 cohorts of injured patients in which TIC was managed with either a VHA-based algorithm or a conventional coagulation test (CCT)-based algorithm.

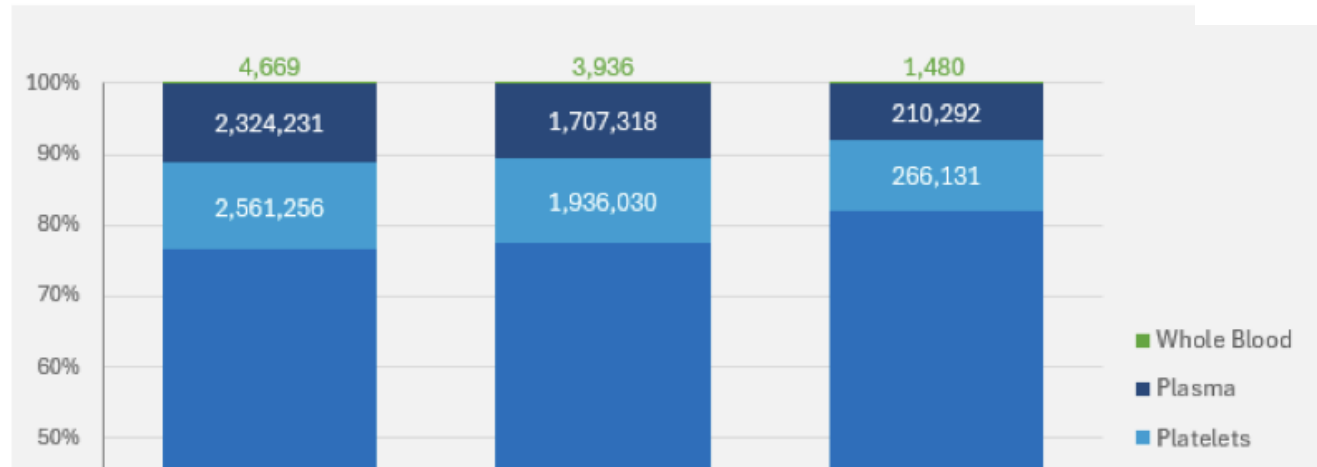
Results From 2012 to 2019, **7250** patients were admitted in the 2 trauma centres, and among these 624 were included in the study (CCT group: 380; VHA group: 244). After propensity score matching, 215 patients remained in each study group without any significant difference in demographics, vital signs, injury severity, or laboratory analysis. **At 24 h, more patients were alive and free of MT in the VHA group (162 patients, 75%) as compared to the CCT group (112 patients, 52%; $p < 0.01$) and fewer patients received MT (32 patients, 15% vs. 91 patients, 42%, $p < 0.01$).** However, no significant difference was observed for mortality at 24 h (odds ratio 0.94, 95% CI 0.59–1.51) or survival at day 28 (odds ratio 0.87, 95% CI 0.58–1.29). Overall cost of blood products and coagulation factors was dramatically reduced in the VHA group as compared to the CCT group (median [interquartile range]: **2357 euros** [1108–5020] vs. **4092 euros** [2510–5916], $p < 0.001$).

Conclusions : VHA-based strategy was associated with an increase of the number of patients alive and free of MT at 24 h together with an important reduction of blood product use and associated costs. However, that did not translate into an improvement in mortality.

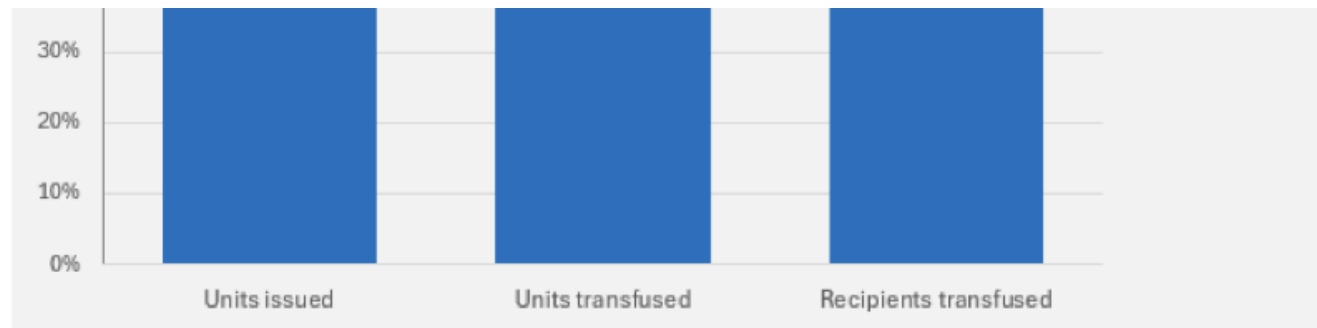


HAEMOVIGILANCE ANNUAL SARE REPORT 2024

(Data collected from 01/01/2023 to 31/12/2023 and
submitted to the European Commission in 2024)



Published studies show that between 40% to 60% of transfusions are inappropriate, suggesting no benefit or worse—harm to patient



Shander A, Fink A, Javidroozi et al International Consensus Conference on Transfusion Outcomes Group. Appropriateness of allogeneic red blood cell transfusion: the international consensus conference on transfusion outcomes. *Transfus Med Rev.* 2011; 25(3):232-246.e53

Figure 13. Percentage distribution of total number of units issued, transfused and recipients by type of BC in 2023

Association Between Ratio of Fresh Frozen Plasma to Red Blood Cells During Massive Transfusion and Survival Among Patients Without Traumatic Injury

Tomaz Mesar, MD¹; Andreas Larentzakis, MD, PhD¹; Walter Dzik, MD²; [et al](#)

Findings In this retrospective study of 865 massive transfusion events in an urban academic hospital, nearly 90% of all massive transfusions were received by patients without trauma, but there was no evidence that a ratio-based transfusion strategy of high fresh frozen plasma to red blood cells ratio improved survival.

Conclusions

At Massachusetts General Hospital, high FFP:RBC transfusion ratios are being used in patients without trauma, who account for nearly 90% of all MT events. **Thirty-day survival was not significantly different in patients receiving a high FFP:RBC ratio compared with those receiving a low ratio.** Additional studies are necessary to refine MTPs in nontrauma specialties.

Table 4. Blood Product Transfusions and 30-Day Mortality by FFP:RBC Ratio Tertile Excluding Patients With Trauma

Variable	FFP:RBC Ratio			P Value ^a
	High (n = 257)	Medium (n = 254)	Low (n = 256)	
Median (IQR) FFP:RBC ratio	1:0.9 (1:0.4-1:1.1)	1:1.4 (1:1.2-1:1.7)	1:3.0 (1:1.7-1:21)	
RBCs transfused, median (IQR), U	16.0 (12.0-24.0)	15.0 (12.0-22.0)	12.0 (11.0-16.0)	<.001
FFP transfused, median (IQR), U	21.0 (15.0-30.0)	12.0 (9.0-18.0)	5.0 (2.0-8.0)	<.001
Cryoprecipitate transfused, median (IQR), U	4.0 (0.0-10.0)	0.0 (0.0-10.0)	0.0 (0.0-5.0)	<.001
Platelets transfused, median (IQR), U	30.0 (18.0-48.0)	18.0 (12.0-36.0)	12.0 (0.0-24.0)	<.001
Mortality rate, No. (%)				
All nontrauma	70 (27)	62 (24)	56 (22)	.16
Cardiac	27 (31)	30 (28)	19 (24)	.39
Liver transplant	10 (14)	2 (8)	4 (27)	.25
General	17 (52)	7 (28)	5 (18)	.008
Vascular	4 (14)	8 (26)	8 (42)	.045
Medicine	8 (80)	4 (40)	14 (25)	.002
Orthopedics	3 (43)	5 (25)	2 (7)	.04
Cardiopulmonary transplant, No. (%)	0	5 (23)	1 (17)	.40
Obstetrics/gynecology	0	0	0	NA
Urology	0	0	1 (17)	>.99
Neurosurgery	0	0	0	NA
Burns	NA	1 (50)	2 (50)	NA
Thoracic	1 (50)	0 (0)	0	>.99
Otolaryngology	NA	NA	0	NA

JAMA Surg. 2017;152(6):574-580. doi:10.1001/jamasurg.2017.0098

TABLE 1 Comparison of viscoelastic and CCT

	VET	CCT
★	Rapid turnaround (usually <30 min)	Slower turnaround (usually >1 h)
	More expensive reagent and labor costs	Less expensive reagent and labor costs
★	Performed on whole blood	Performed on plasma
★	No centrifuging needed	Specimen must be centrifuged
★	Associated with less product usage and better outcomes in acutely bleeding patients	Best suited as anticoagulant screening test in stable, nonbleeding patients
★	Can detect hyperfibrinolysis	Unable to detect hyperfibrinolysis
★	One device evaluates clotting factors, PLTs, and fibrinogen	Multiple devices required to measure clotting factors, PLTs, and fibrinogen
★	More closely resembles in vivo hemostasis	Highly artificial measurement of hemostasis
★	Measures total clot strength	Unable to assess total clot strength, just clot initiation

ESAIC, 2022

The use of ROTEM/TEG is recommended in surgery, trauma, and critical bleeding.

European Trauma Guidelines, 2023

ROTEM/TEG is a superior tool to INR or prothrombin time.

AHA, 2021

The use of ROTEM/TEG is recommended in cardiovascular surgery.

**Haematological management of major
haemorrhage:**
a British Society for Haematology Guideline
2022

We suggest that VHAs are used to guide transfusion therapy in cardiac surgery, although for other clinical settings of major bleeding (e.g. trauma and PPH).

RESEARCH

Open Access

Estimation of plasma fibrinogen levels based on hemoglobin, base excess and Injury Severity Score upon emergency room admission

Christoph J Schlump¹, Wolfgang Voelckel², Kenji Inaba³, Marc Maegele⁴, Martin Ponschab⁵ and Herbert Schöchl^{1,2*}

	ISS 16-24	ISS 25-34	ISS 35-49
Patients n (% of total)	242 (35.9%)	249 (36.9%)	97 (14.4%)
Age (range)	42.5 (26-56)	47 (29.5-60)ns	45 (24-59)ns
Male n (% of ISS group)	200 (82.6%)	195 (78.3%)ns	76 (78.4%)ns
Mortality n (% of ISS group)	5 (2.1%)	32 (12.9%)*	27 (27.8%)*
FIB mg/dL (IQR)	235 (182.5-286.3)	191.0 (143-240)*	134 (94.5-185.5)*
Hb g/dL (IQR)	13.0 (11.7-14.2)	12.3 (10.6-13.7)*	10.9 (8.4-13.0)*
BE mmol/L (IQR)	-2.6 (-4.5 to -1.4)	-3.7 (-6.2 to -2.1)*	-5.7 (-8.5 to -2.9)*

ns, not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, significance values for comparison with previous group; range; ISS, Injury Severity Score.

RADIOMETER ABL 90 SERIE

ABL90 I393-092R0116N0008
VÝSLEDEK PACIENTA Stříkačka - S 65uL 19:43 16.11.2025
Vzorek # 11221

Identifikace
I.D. pacienta 395512408
Příjmení pacienta TICHÁ
Jméno pacienta HELENA
Typ vzorku Arteriální
T 35,7 °C
FO2(I) 21,0 %
Operátor 71169
Rozvržení výsledku OUP PMDV FN BRNO

Acidobazický status
pH 7,369
pCO2 2,95 kPa
pO2 20,2 kPa
ABE,c -11,2 mmol/L
SBE,c -12,6 mmol/L
cHCO3-(P),c 12,7 mmol/L
cHCO3-(P,st),c 15,5 mmol/L
Anion Gap,c 17,8 mmol/L

Hodnoty elektrolytů
cNa+ 136 mmol/L
cK+ 4,9 mmol/L
cCl- 106 mmol/L
cCa2+ 1,06 mmol/L
cCa2+(7.4),c 1,04 mmol/L

Hodnoty metabolitů
cGlu 12,1 mmol/L
cLac 8,9 mmol/L

Hodnoty oximetrie
sO2 99,5 %
ctHb 84 g/L
Hct,c 25,8 %
FMetHb 1,2 %
FCOHb 1,2 %
FHHb 0,5 %
FO2Hb 97,1 %

Vypočítávané hodnoty
pH(T),c 7,388
pCO2(T),c 2,79 kPa
pO2(T),c 19,5 kPa
ctCO2(B),c 27,4 Vol%
ctCO2(P),c 30,1 Vol%
ctO2,c 11,9 Vol%

The Role of Calcium in Coagulation and Anticoagulation

M. E. Mikaelsson

Normal hemostasis requires free ionized calcium for the initial platelet plug formation and also for most events in the blood coagulation process.

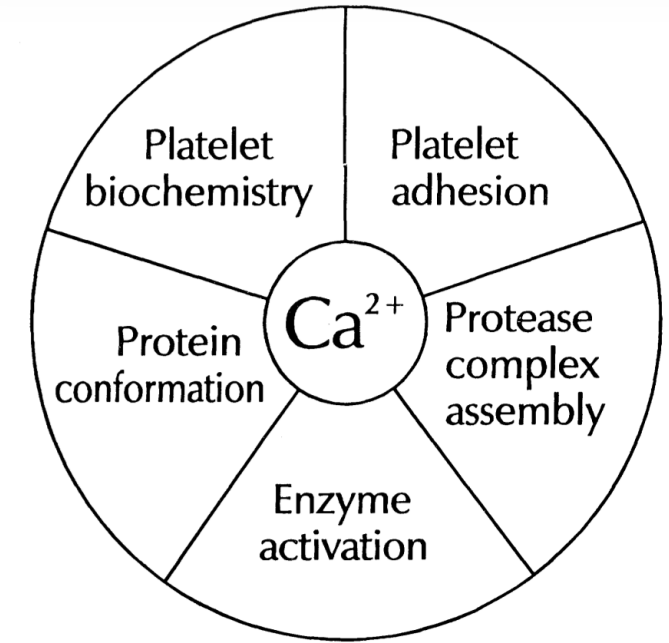
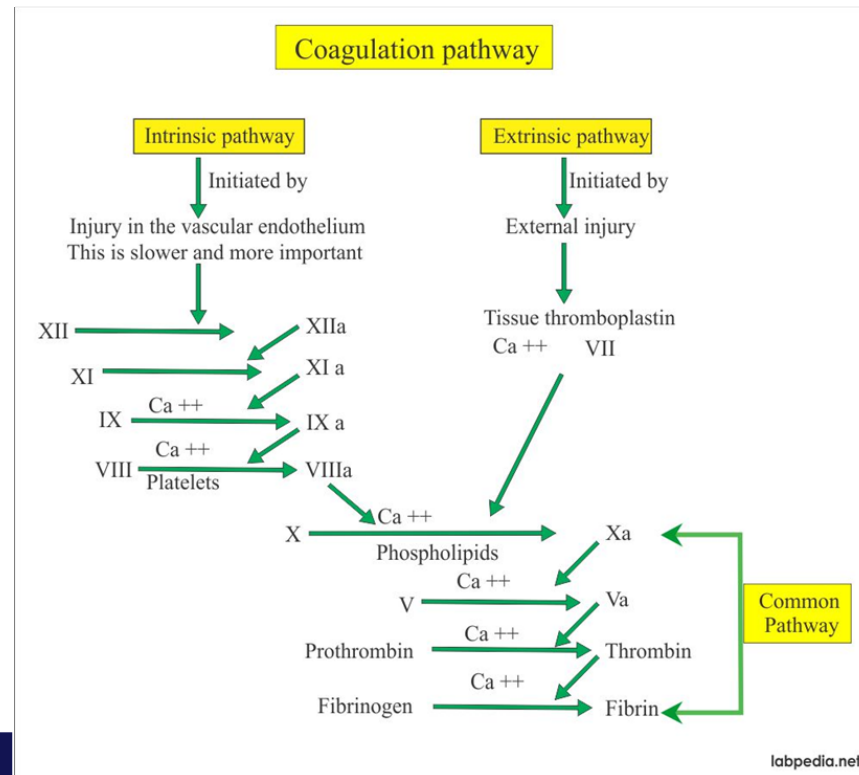


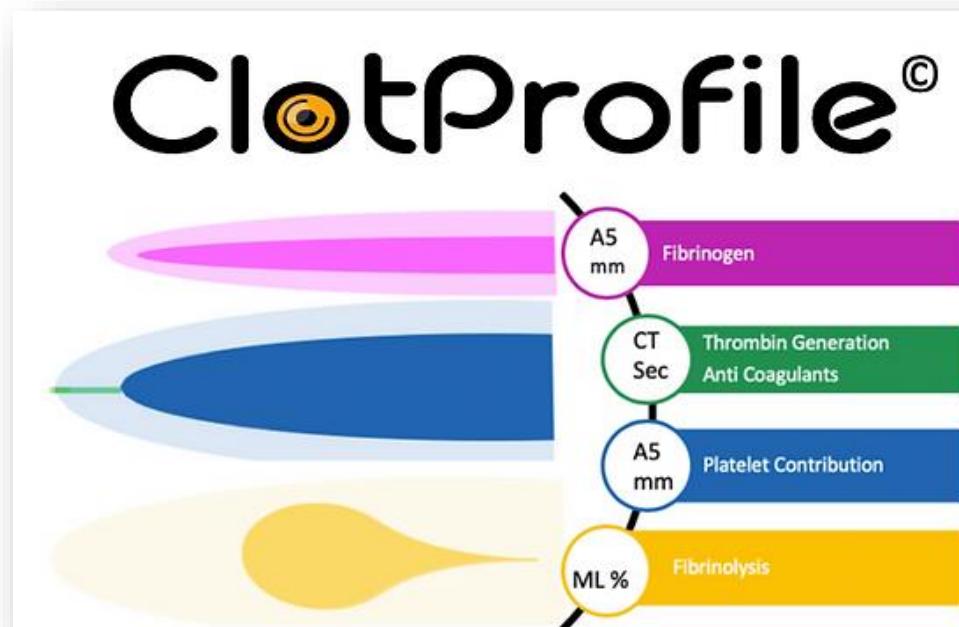
Figure 1. The role of calcium in blood coagulation.

C. T. S. Sibinga et al. (eds.), *Coagulation and Blood Transfusion*
© Kluwer Academic Publishers 1991

Viskoelastické testy

- akutní závažné nebo život ohrožujícím krvácením

- Diferenciální diagnostika mezi koagulopatickým a chirurgickým krvácením
- Typ koagulopatie
- Cílená hemosubstituční terapie



koagulopatická porucha - deficit fibrinogenu

muž *1989 řidič OA čelní náraz

Leukocyty	10 ⁹ /l	8.49
Erytrocyty	10 ¹²	> 5.74
Hemoglobin	g/l	162
Hematokrit	l/l	0.45
Střední objem ERY	fL	78.9
Trombocyty	10 ⁹ /l	304

Protrombin.čas	INR	0.91
Protrombin.čas	s	13.2
Protrombin.čas	R	0.92
Fibrinogen	g/l	2.33
aPTT -ratio	R	0.85
aPTT	s	28.3
Trombinový čas	s	23.9

Jméno : ██████████

Datum narození : *

Oddělení :

Vzorek č. :

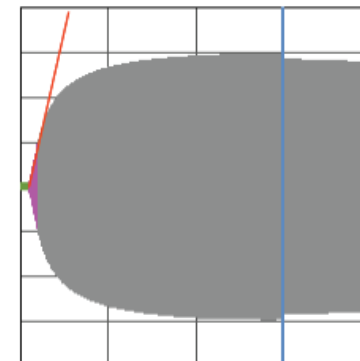
Pacient č. : 8904214022

Test : EX-test

Čas spuštění : 17.12.2020 08:54:58 - Doba analýzy: 60m:00s (Zastaven)

Výsledky :	CT	71s	▲ 38-65
	A5	47mm	► 39-58
	A10	54mm	► 47-64
	A20	59mm	► 52-67
	MCF	59mm	► 53-68
	CFT	52s	► 42-93
	ML	6%	► 2-12

Komentář :



Kanál: 1

t: c: CP43514CA8407

Jméno : ██████████

Datum narození : *

Oddělení :

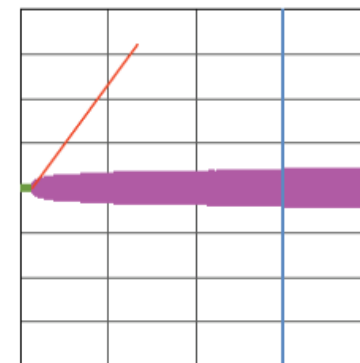
Vzorek č. :

Pacient č. : 8904214022

Test : FIB-test

Čas spuštění : 17.12.2020 08:54:28 - Doba analýzy: 60m:00s (Zastaven)

Výsledky :	CT	83s	► 55-87
	A5	6mm	▼ 6-21
	A10	7mm	► 7-23
	A20	8mm	▼ 8-25
	MCF	9mm	▼ 9-27



Kanál: 2

t: c: CP43514CA8407

koagulopatická porucha - hyperfibrinolýza

muž *1936 dopravní nehoda OA

Leukocyty	10 ⁹ /l	18.85
Erytrocyty	10 ¹² >	4.36
Hemoglobin	g/l	128
Hematokrit	l/l	0.38
Trombocyty	10 ⁹ /l	186

Protrombin.čas	INR	1.27
Protrombin.čas	s	17.5
Protrombin.čas	R	1.25
Fibrinogen	g/l	2.47
aPTT -ratio	R	1.05
aPTT s	s	36.1
Trombinový čas	s	24.6



Jméno : ██████████

Datum narození : *

Oddělení :

Vzorek č. : 360830406

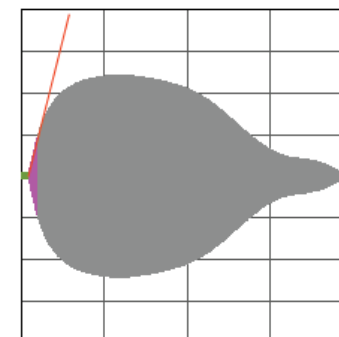
Pacient č. ██████████

Test : EX-test

Čas spuštění : 08.04.2020 15:13:10 - Doba analýzy: 39m:26s (Probíhá test)

Výsledky :	CT	65s	► 38-65
	A5	43mm	► 39-58
	A10	49mm	► 47-64
	A20	40mm	▼ 52-67
	MCF	49mm	▼ 53-68
	CFT	60s	► 42-93
	ML	97%	▲ 2-12

Komentář :



Kanál: 1

t: c: CP43514CA8407



Jméno : ██████████

Datum narození : *

Oddělení : ██████████

Vzorek č. : 360830406

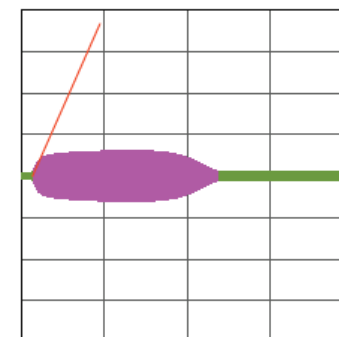
Pacient č. : 360830406

Test : FIB-test

Čas spuštění : 08.04.2020 15:13:53 - Doba analýzy: 38m:43s (Probíhá test)

Výsledky :	CT	84s	► 55-87
	A5	11mm	► 6-21
	A10	12mm	► 7-23
	A20	6mm	▼ 8-25
	MCF	12mm	► 9-27
	LT	1210s	
	ML	88%	▲ 0-2

Komentář :



Kanál: 2

t: c: CP43514CA8407



koagulopatická porucha - cílená terapie

muž 1977* poranění padajícím stromem

Leukocyty	10 ⁹ /l	32.88
Erytrocyty	10 ¹² >	4.42
Hemoglobin	g/l	132
Hematokrit	l/l	0.39
Trombocyty	10 ⁹ /l	280

Protrombin.čas	INR	1.07
Protrombin.čas	s	15.4
Protrombin.čas	R	1.07
Fibrinogen	g/l	2.00
aPTT -ratio	R	1.06
aPTT s	s	35.4
Trombinový čas	s	25.6



Jméno: [redacted]

Datum narození : * ♂

Oddělení :

Vzorek č. :

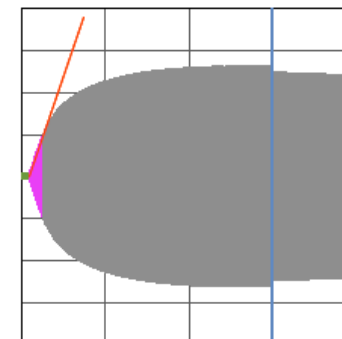
Pacient č. : 770315/3502

Test : EX-test

Čas spuštění : 30.11.2020 10:59:49 - Doba analýzy: 60m:00s (Zastaven)

Výsledky :	CT	69s	▲ 38-65
	A5	38mm	▼ 39-58
	A10	47mm	▼ 47-64
	A20	52mm	► 52-67
	MCF	53mm	▼ 53-68
	CFT	87s	► 42-93
	ML	8%	► 2-12

Komentář :



Kanál: 1

t: c: CP43514CA8407



Jméno: [redacted]

Datum narození : * ♂

Oddělení :

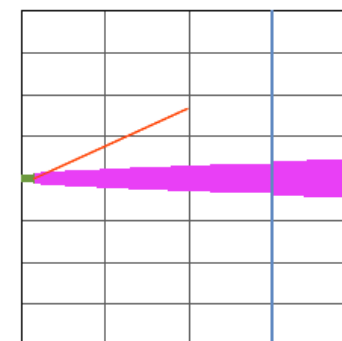
Vzorek č. :

Pacient č. : 770315/3502

Test : FIB-test

Čas spuštění : 30.11.2020 11:00:52 - Doba analýzy: 60m:00s (Zastaven)

Výsledky :	CT	96s	▲ 55-87
	A5	4mm	▼ 6-21
	A10	4mm	▼ 7-23
	A20	6mm	▼ 8-25
	MCF	9mm	▼ 9-27



Kanál: 2

t: c: CP43514CA8407



po terapii



FAKULTNÍ
NEMOCNICE
BRNO

MUNI
MED

Jméno : [REDACTED]

Datum narození : * ♂

Oddělení :

Vzorek č. :

Pacient č. : [REDACTED]

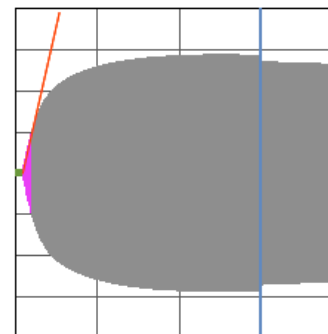
Test : EX-test

Čas spuštění : 30.11.2020 11:23:25 - Doba analýzy: 60m:00s (Zastaven)

Výsledky :

CT	68s	▲ 38-65
A5	45mm	► 39-58
A10	53mm	► 47-64
A20	57mm	► 52-67
MCF	58mm	► 53-68
CFT	55s	► 42-93
ML	8%	► 2-12

Komentář :



Kanál: 3

t: c: CP43514CA8407



Jméno : [REDACTED]

Datum narození : * ♂

Oddělení :

Vzorek č. :

Pacient č. : [REDACTED]

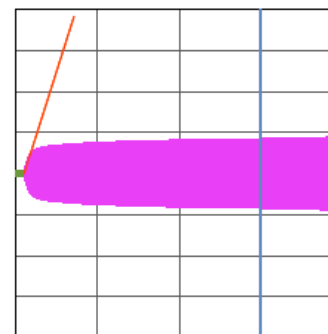
Test : FIB-test

Čas spuštění : 30.11.2020 11:24:06 - Doba analýzy: 60m:00s (Zastaven)

Výsledky :

CT	67s	► 55-87
A5	14mm	► 6-21
A10	15mm	► 7-23
A20	16mm	► 8-25
MCF	18mm	► 9-27

Komentář :



Kanál: 4

t: c: CP43514CA8407



kontrola terapie

Variations and obstacles in the use of coagulation factor concentrates for major trauma bleeding across Europe: outcomes from a European expert meeting

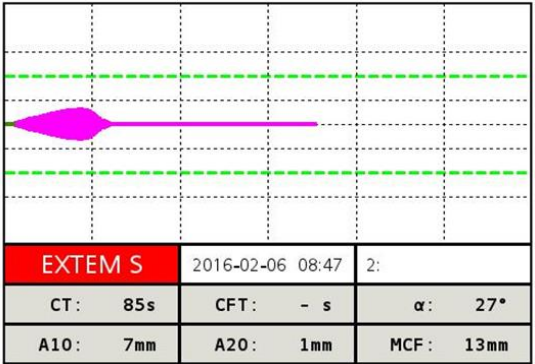
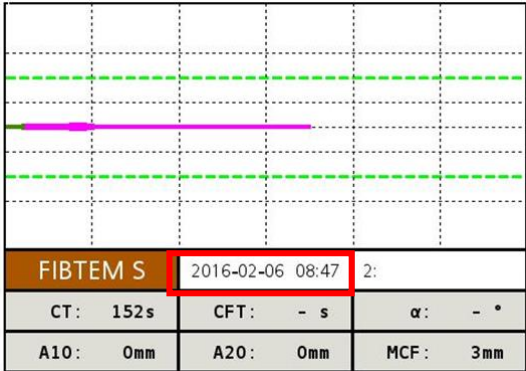
European Journal of Trauma and Emergency Surgery
<https://doi.org/10.1007/s00068-020-01563-2>

Vladimir Černý¹ · Marc Maegele² · Vanessa Agostini³ · Dietmar Fries⁴ · Santiago R. Leal-Noval⁵ · Gábor Nardai⁶ · Giuseppe Nardi⁷ · Anders Östlund⁸ · Herbert Schöchl⁹

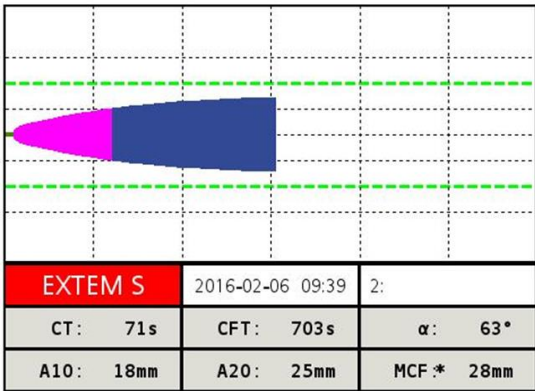
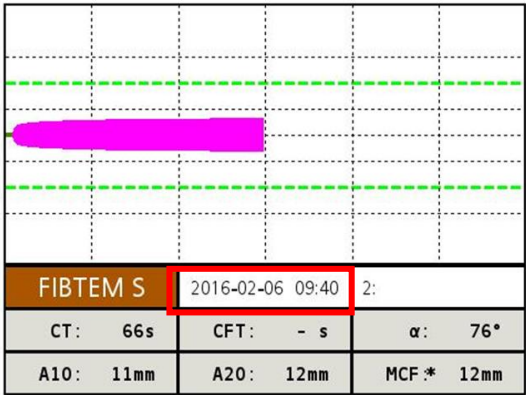


After initial fbrinogen supplementation, and if bleeding continues, further viscoelastic (FIBTEM) testing should be conducted **after - 30 min**, to verify the impact of the fbrinogen supplementation and to identify other causes for bleeding that may have previously been masked by hypofbrinogenaemia.

- polytrauma ISS 41
- traumatická zástava oběhu
 - hemoragický šok



- kontrola po aplikaci
- Haemocompletan 10 g i.v.,
 - Ocplex 1000 j i.v.
 - 14x EBR, 6x MP,
 - CaCl 2 2 amp. i.v., Exacyl 1 g i.v.



Viskoelastické testy

– sledování účinku antikoagulační terapie

- Diferenciální diagnostika antikoagulační terapie
- Verifikace medikace (iCMP, ICH)
- Cílená terapie (podání specifických antidot)

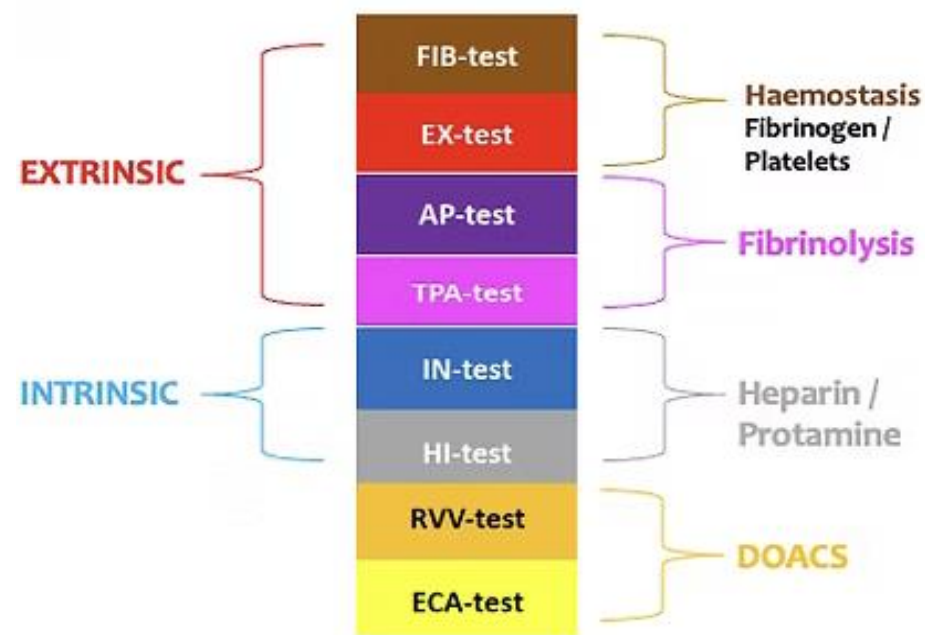
ECA-test

ECA-test is a ready to use system reagent for the detection of dabigatran in citrated blood for the ClotPro analyzer. Ecarin, a thrombin activator derived from the venom of the saw-scaled viper (Echis carinatus) activates prothrombin from the blood sample.

RVV-test

Ready to use system reagent for the detection of factor Xa (FXa) antagonists in citrated blood. CaCl_2 recalcifies the sample and reagent derived from Russells viper venom (RVV) activates FX in the sample to FXa. This FXa triggers coagulation and clot formation.

ClotPro



GUIDELINES

Clinical guideline on reversal of direct oral anticoagulants in patients with life threatening bleeding

Oliver Grottke, Arash Afshari, Aamer Ahmed, Eleni Arnaoutoglou, Daniel Bolliger, Christian Fenger-Eriksen and Christian von Heymann



ClotPro



In the clinical scenarios of DOAC intake before urgent procedures and DOAC-induced bleeding, practitioners should evaluate the risk of bleeding of the procedure and the severity of the DOAC-induced bleeding before initiating treatment.

Recommendation

R 2.1: We do not suggest the use of nonspecific viscoelastic coagulation monitoring to reliably detect DOAC levels. (2B)

R 2.2: If available, we suggest the use of specific tests (Ecarin clotting time and the Russell's viper venom test) in viscoelastic coagulation monitoring to exclude DOAC plasma levels. (2C)

R 2.3 In the absence of specific coagulation testing, DOAC dipstick testing can be suggested to demonstrate the presence of DOACs. (2C)

Pradaxa

muž *1945 pád z vlaku

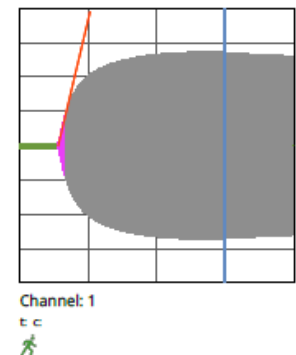


MUNI
MED

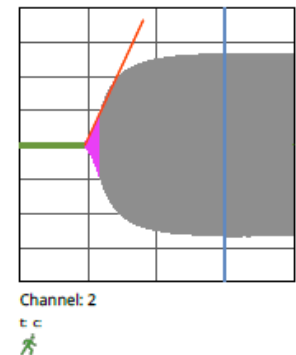
Leukocyty	12.140
Erytrocyty	3.83
Hemoglobin	126.0
Hematokrit	0.370
Trombocyty	208.0

Protrombin.čas	1.66	INR
Protrombin.čas	23.1	s
Protrombin.čas	1.64	R
Fibrinogen	3.67	g/l
aPTT -ratio	1.86	R
aPTT s	62.50	s
Pradaxa antilla	300	ug/l

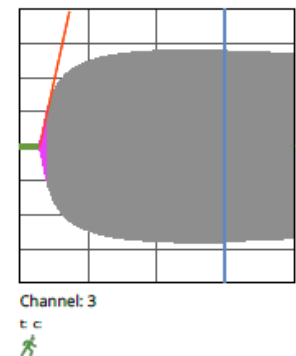
Name : fr [redacted] ian
Date of birth : * ♂
Ward :
Sample No. : 450113459
Patient No. :
Test : IN-test
Start time : 18.10.2019 14:48:07 - Run time: 50m:08s (Running)
Results :
CT 338s ▲ 139-187
AS 42mm ► 32-53
A10 50mm ► 41-61
A20 55mm ► 48-65
MCF 55mm ► 49-65
CFT 70s ► 52-139
LT
ML 5% ► 1-11
Comment :



Name : fr [redacted] ian
Date of birth : * ♂
Ward :
Sample No. : 450113459
Patient No. :
Test : ECA-test
Start time : 18.10.2019 14:50:26 - Run time: 47m:39s (Running)
Results :
CT 574s ▲ 68-112
AS 40mm ▼ 45-60
A10 50mm ▼ 54-66
A20 53mm ▼ 59-70
MCF 53mm ▼ 61-72
CFT 135s ▲ 60-90
LT
ML 1%
Comment :



Name : fr [redacted] ian
Date of birth : * ♂
Ward :
Sample No. : 450113459
Patient No. :
Test : EX-test
Start time : 18.10.2019 14:52:26 - Run time: 45m:49s (Running)
Results :
CT 187s ▲ 38-65
AS 46mm ► 30-60
A10 53mm ► 47-64
A20 56mm ► 52-67
MCF 56mm ► 53-68
CFT 52s ► 42-93
ML 4% ► 2-12
Comment :



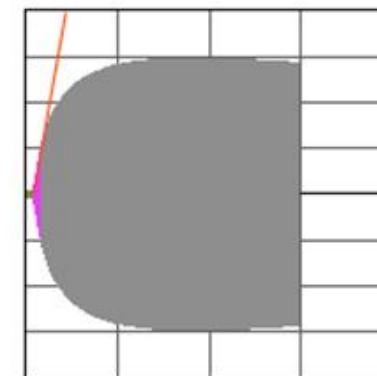
žena *1944 iCMP

Emergency card:
Eliguis

Protrombin.čas	0.83	INR
Protrombin.čas	11.8	s
Protrombin.čas	0.84	R
Fibrinogen	2.79	g/l
aPTT -ratio	0.74	R
aPTT s	25.50	s
Trombinový čas	21.4	s
Eliguis antiXa	<. >	0 ug/l

Jméno : XXXXXXXXXX
Datum narození : *
Oddělení :
Vzorek č. :
Pacient č. : 445404416
Test : RVV-test
Čas spuštění : 13.11.2019 20:48:54 - Doba analýzy: 30m:00s (Zastaven)
Výsledky :

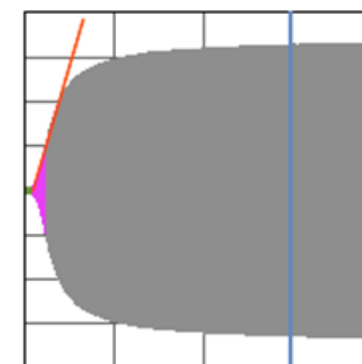
CT	49s	▼ 49-79
A5	49mm	► 40-55
A10	57mm	► 49-63
A20	59mm	► 53-67
MCF	59mm	► 53-69
CFT	52s	► 35-85
ML	4%	► 0-6



Kanál: 3
t: c: CP43514CA8407

Jméno : XXXXXXXXXX
Datum narození : *
Oddělení :
Vzorek č. :
Pacient č. : 445404416
Test : ECA-test
Čas spuštění : 13.11.2019 20:49:35 - Doba analýzy: 44m:04s (Probíhá test)
Výsledky :

CT	50s	▼ 68-112
A5	51mm	► 45-60
A10	60mm	► 54-66
A20	64mm	► 59-70
MCF	66mm	► 61-72
CFT	87s	► 60-90

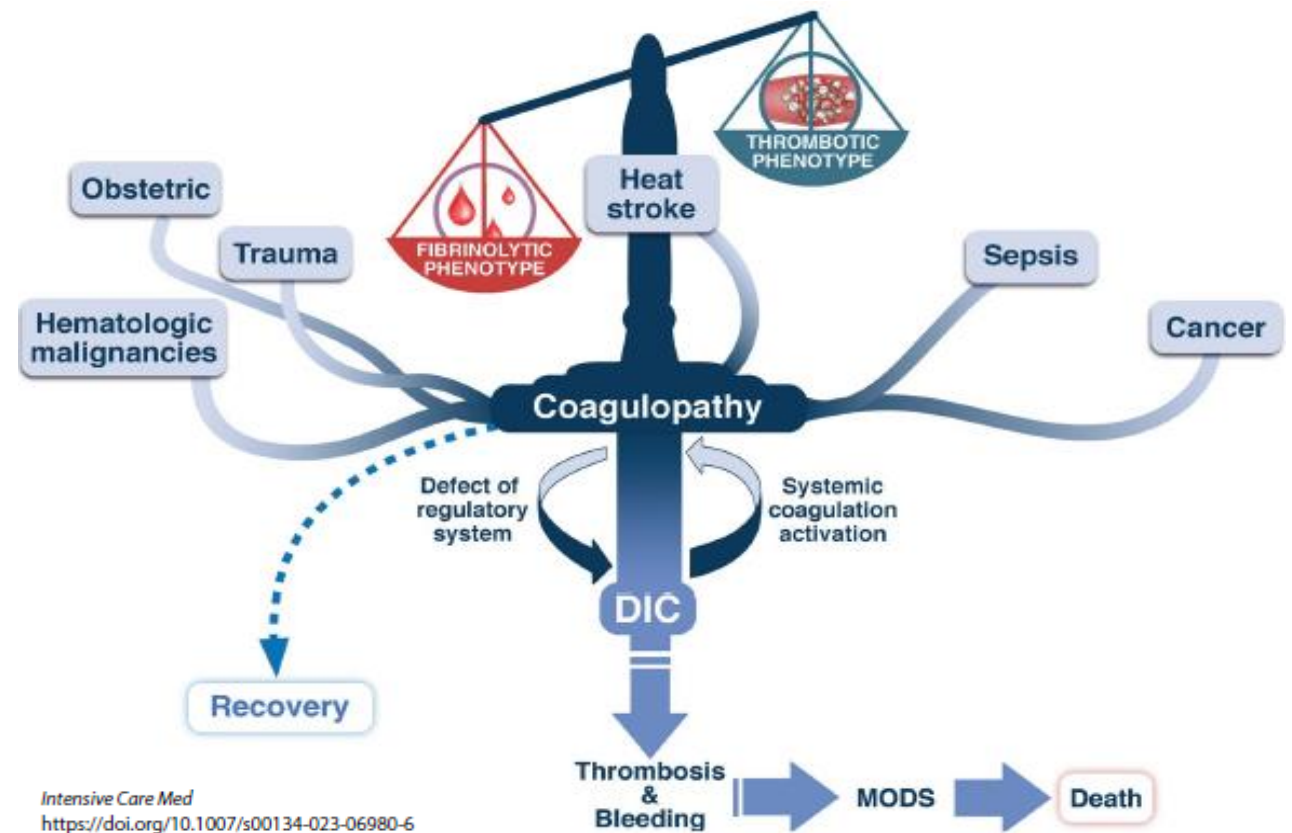
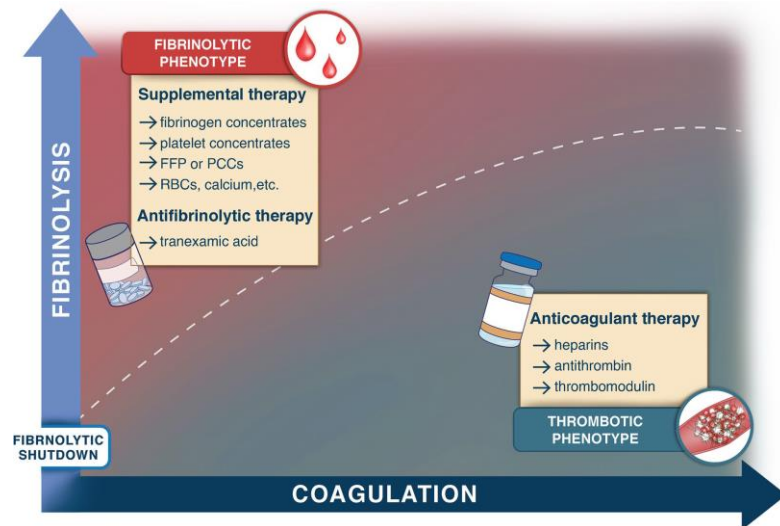


Kanál: 4
t: c: CP43514CA8407
22

Viskoelastické testy

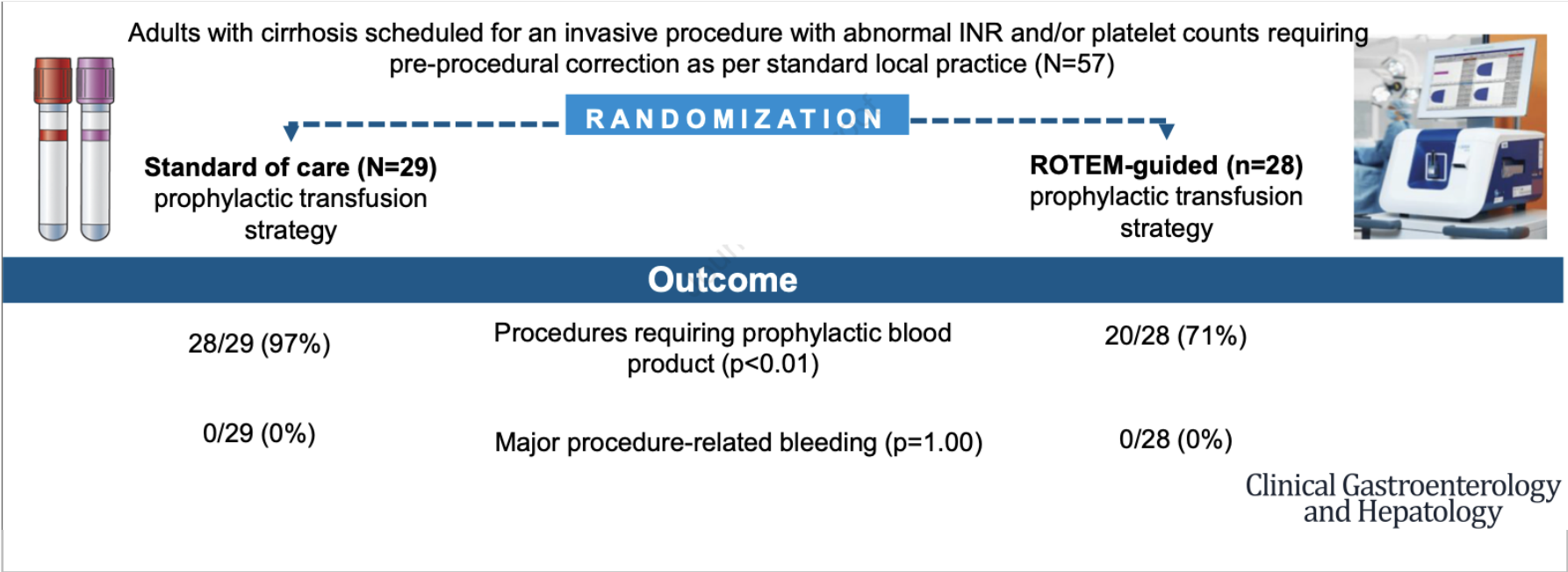
- koagulační profil u “non bleeding” pacientů k posouzení aktuálního koagulačního profilu před intervenčním výkonem

- Diferenciální diagnostika hyper/hypokoagulačních poruch jako důsledek primárního onemocnění
- Cílená příprava
- Timing invazivního výkonu



ROTEM-guided blood product transfusion in patients with cirrhosis having invasive procedures: a randomized controlled trial

Natasha Janko, William Kemp, Simone I. Strasser, Marcus Robertson, Fadak Mohammadi, Rohit Sawhney, Avik Majumdar, Karen Waller, Gerry MacQuillan, Tom Goodwin, Paul Gow, Chris Hogan, Harshal Nandurkar, Ammar Majeed, Stuart K. Roberts



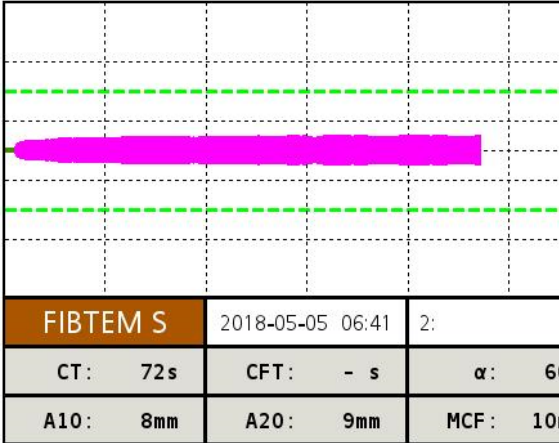
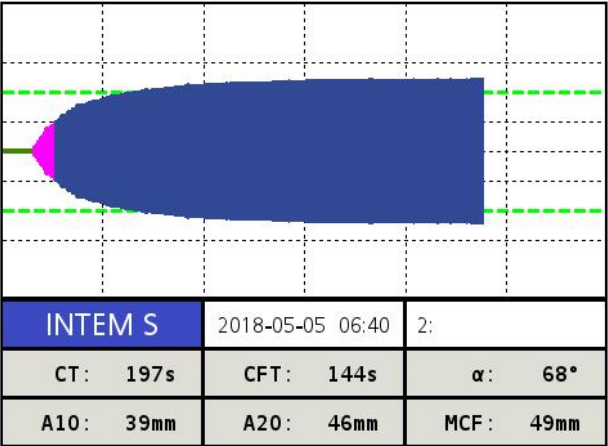
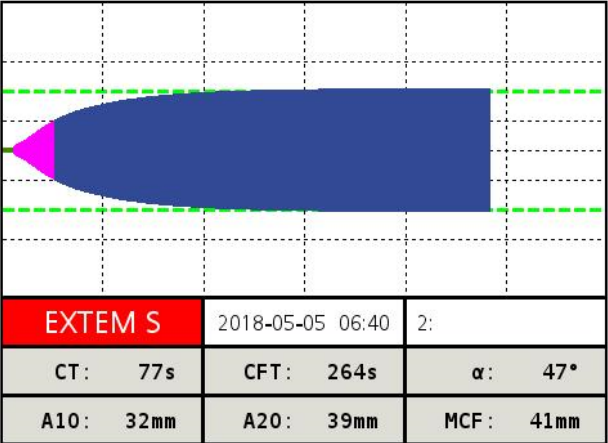
<https://doi.org/10.1016/j.cgh.2026.07.038>

žena * 1962

toxonutritivní cirrhoza
příprava před intervenčním
výkonem

Leukocyty	4.280	10 ⁹ /l
Erytrocyty	2.90	10 ¹² /l
Hemoglobin	83.0	g/l
Hematokrit	0.260	l/l
Trombocyty	38.0	10 ⁹ /l

Protrombin.čas	1.46	INR
Protrombin.čas	20.9	s
Protrombin.čas	1.47	R
Fibrinogen	1.71	g/l



Take home message

Rychlá a cílená hemostatická monitorace = správná léčba ve správný čas a bezpečnější péče o pacienta.

