Cílená léčba život ohrožujícího krvácení dle trombelastometrie

(koncentráty koagulačních faktorů)

ivana zýková

Cílená léčba koncentráty koagulačních faktorů dle trombelastometrie v doporučených postupech

2013

European Society of Anaesthesiology ESA | EJA European Journal Of Anaesthesiology | European Society of Anaesthesiology ESA

Guidelines on the management of severe perioperative bleeding

Sibylle A. Kozek-Langenecker[1], Arash Afshari[2], Pierre Albaladejo[3], Cesar Aldecoa Alvarez Santullano[4], Edoardo De Robertis[5], Daniela C. Filipescu[6], Dietmar Fries[7], Klaus Görlinger[8], Thorsten Haas[9], Georgina Imberger[10], Matthias Jacob[11], Marcus Lancé[12], Juan Llau[13], Sue Mallett[14], Jens Meier[15], Niels Rahe-Meyer[16], Charles Marc Samama[17], Andrew Smith[18], Cristina Solomon[19], Philippe Van der Linden[20], Anne Juul Wikkelsø[21], Patrick Wouters[22], Piet Wyffels[22]

Spahn *et al. Crit*
http://ccforum.co

CRITICAL CARE

RESEARCH Open Access

Management of bleeding and coagulopathy following major trauma: an updated European guideline

Donat R Spahn[1], Bertil Bouillon[2], Vladimir Cerny[3,4], Timothy J Coats[5], Jacques Duranteau[6], Enrique Fernández-Mondéjar[7], Daniela Filipescu[8], Beverley J Hunt[9], Radko Komadina[10], Giuseppe Nardi[11], Edmund Neugebauer[12], Yves Ozier[13], Louis Riddez[14], Arthur Schultz[15], Jean-Louis Vincent[16] and Rolf Rossaint[17*]

Coagulation monitoring

Recommendation 12

We recommend that routine

practice to detect po

coagulopathy i

repeated

me

(APTT),

platelets. (Grade

recommend that viscoel

methods also be performe

assist in characterising the

coagulopathy and in guidin

haemostatic therapy. (Grade 1C)

použití viskoelastických metod

Coagulation monitoring

ecommendation 12

recommend that routine

ractice to detect post-traum

oagulopathy include th

repeated and com

measuremen

time (P

ts. (Grade

end that viscoelastic

thods also be performed to

assist in characterising the

coagulopathy and in guiding

haemostatic therapy. (Grade 1C)

kyselina tranexamová

V. Management krvácení a koagulace

Plasma

Recommendation 26

We recommend the initial
(fresh frozen plas
plasma) (Gr
patie
, we suggest an optimal
atio of at least 1:2. (Grade 2C)
hat plasma transfusion be avoided in
without substantial bleeding. (Grade 1B)

FFP nebo fibrinogen

Prothrombin complex concentrate

Recommendation 31

We recommend the early use of prothrombin

emergency reversal of vitamin K

If a cong

be

we suggest that PCC

oelastometric evidence of delayed

Thromboelastometry appears to be a useful tool to guide

py in patients with traumatic coagulopathy

PCC při prodloužení iniciace

Oute

- Bleedi

Cílená léčba koncentráty koagulačních faktorů snižuje počet podaných transfuzních přípravků

Cílená léčba koncentráty koagulačních faktorů snižuje ICU dny, délku UPV i počet infekčních komplikací

Cena, komplikace

- Implementation of transfusion and co
  management algorithms (base
  reduce transfusion-asso
  surgery and liver t
- Goal-dire
  con

Pokles nákladů

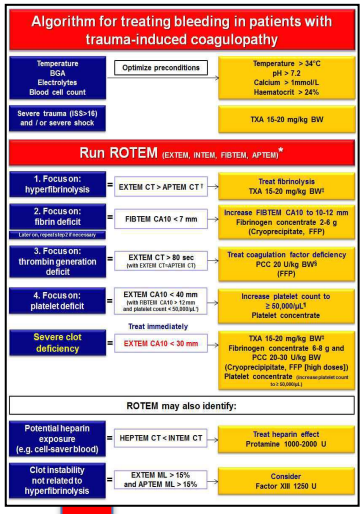
dlac

ssociated with
nd post-hospital costs. B

py with fibrinogen and/or PCC guided
M/TEG is not associated with an increased
ncidence of thromboembolic events. C

naše evoluce

+ fibrinogen



2008 2009 2010 2011 2012 2013 2014

Implementace systému časného a rutinního POC vyšetření koagulace je stěžejní

(2009 až dnes)

„denní praxe“

Život ohrožující krvácení = přítomnost anesteziologa

- **Trauma tým**
- **Operační sály**
- **Porodnické krvácení**
- **Urgentní příjem**
- **ICU, …….**

Rotem je umístěn na lůžkové stanici ARO (2 přístroje a Platelet)

Vzorky jsou přinášeny na ARO z celé nemocnice

Všichni lékaři na ICU provádějí vyšetření a analýzu křivek s doporučením další terapie

Organizace urgentního traumatologického příjmu KNL

Triage pozitivní pacient

Standardní postup
15 minut (ATLS)

Diagnostika a terapie
Vyloučení či vyřešení život ohrožujících stavů

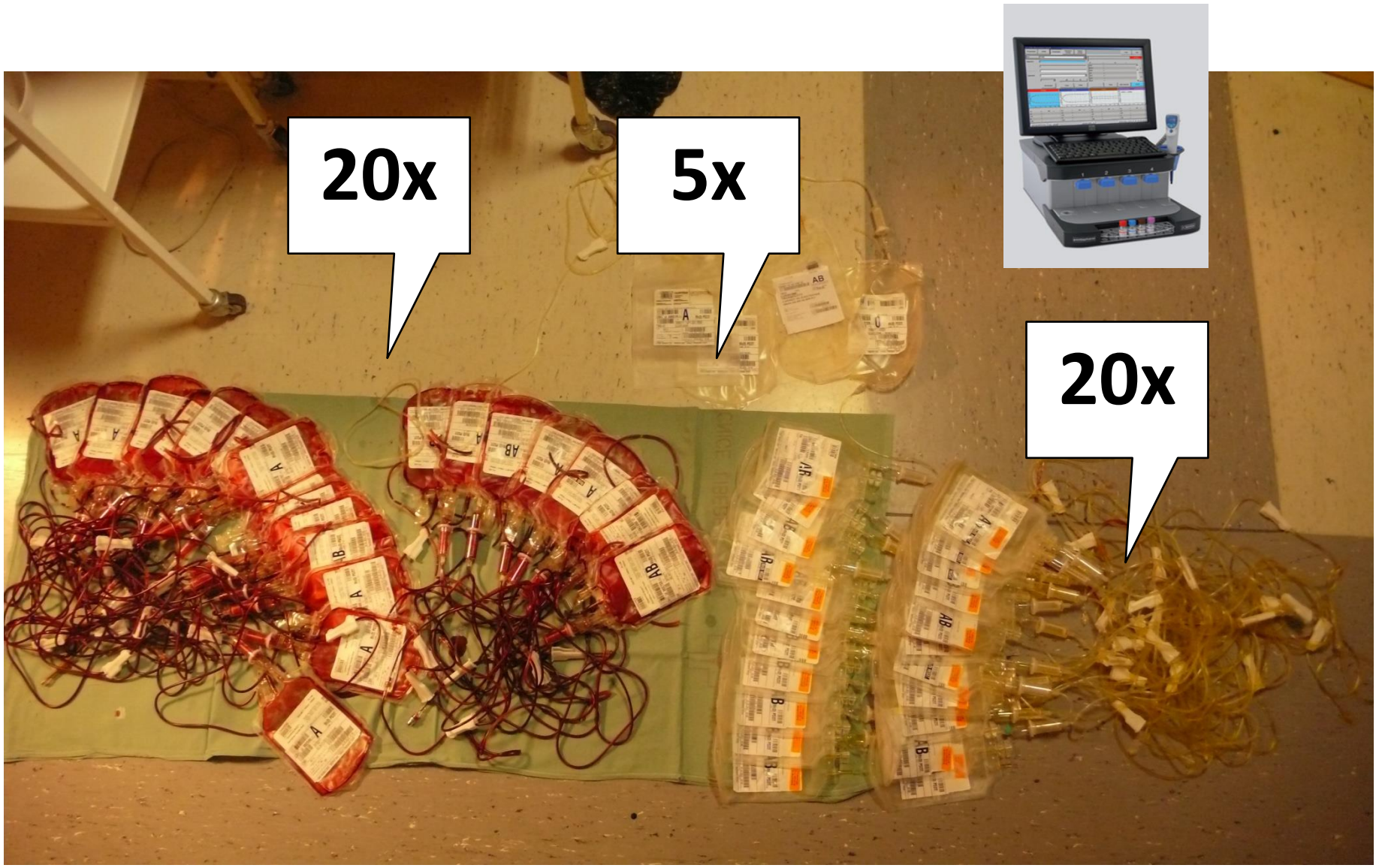
Dýchací cesty
Zdroje velkého krvácení: hemothorax, hemoperitoneum, nestabilní pánev, fraktury dlouhých kostí, zevní krvácení
Tenzní pneumothorax
Tamponáda srdeční

Oběhově stabilní x nestabilní pacient

CT v režimu polytrauma

Zástava krvácení: OR, AG,...

naše evoluce

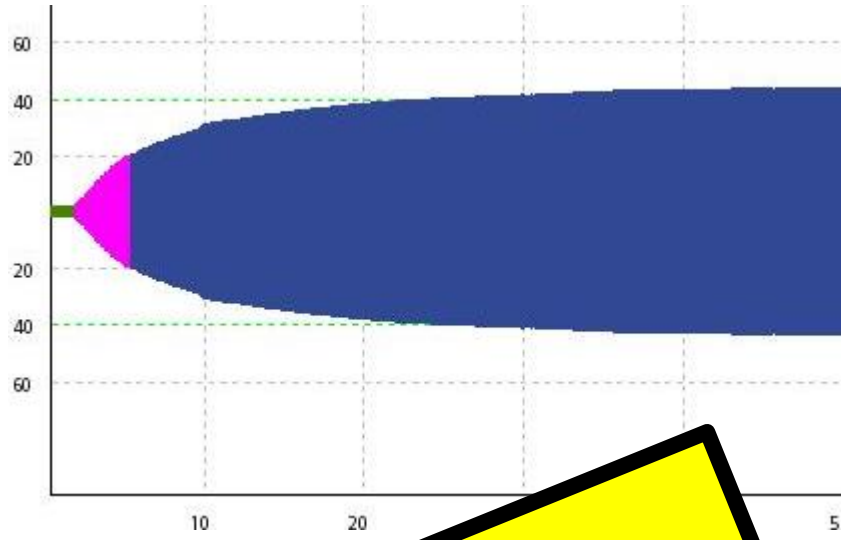

20x
5x
20x

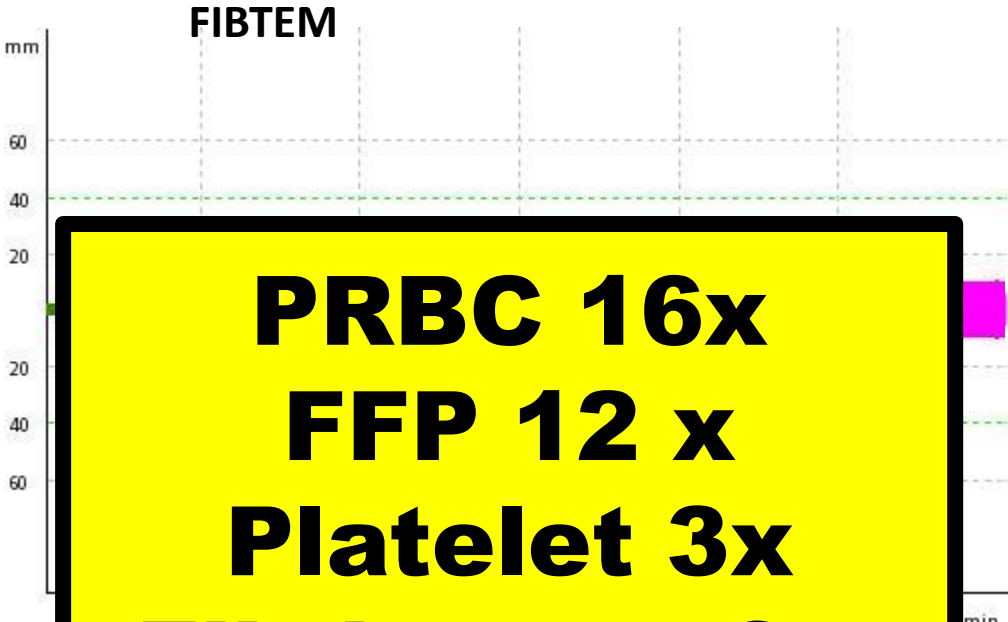
kasuistika
after ROTEM/before algorithm

- Female, 21 years, collision with a car on a motorcycle
- BP 65/30, P 140/min on admission
- FAST – haemoperitoneum, pelvic fracture
- taken to OR
- external pelvic fixation, laparotomy, splenic rupture, splenectomy, tamponade
- CT scan
- Leak from cauda pancreatis and splenic hilus
- Relaparotomy, tamponade

2010

case report after ROTEM/before algorithm

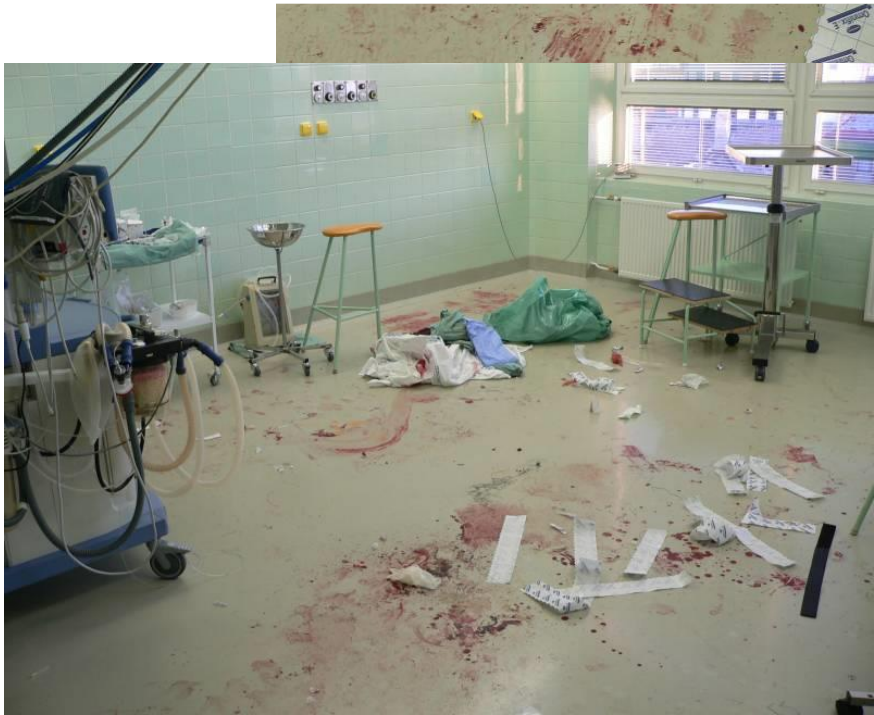


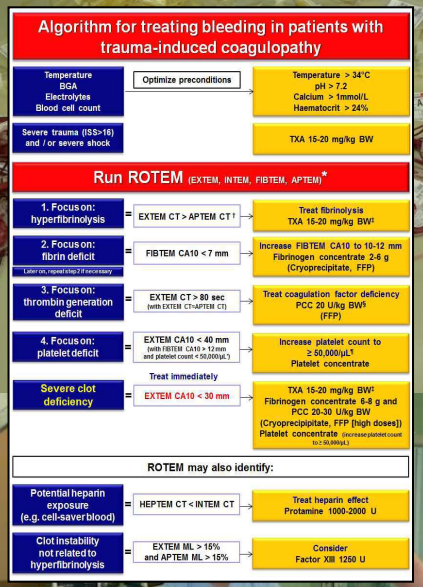


2010

PRBC 16x
FFP 12 x
Platelet 3x
Fibrinogen 6 g
PCC 1500 i.u.

Masivní transfuzní protokol a fibrinogen dle ROTEM





Cílená léčba koncentráty koagulačních faktorů

2014

Schöchl et al. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine 2012, 20:15
http://www.sjtrem.com/content/20/1/15

SCANDINAVIAN JOURNAL OF
trauma, resuscitation
& emergency medicine

REVIEW Open Access

Early and individualized goal-directed therapy for trauma-induced coagulopathy

Herbert Schöchl[1,2*], Marc Maegele[3], Cristina Solomon[1], Klaus Görlinger[4] and Wolfgang Voelckel[2]

Abstract

Severe trauma-related bleeding is associated with high mortality. Standard coagulation tests provide limited information on the underlying coagulation disorder. Whole-blood viscoelastic tests such as rotational thromboelastometry or thrombelastography offer a more comprehensive insight into the coagulation
trauma. The results are available within minutes and they provide information about the initia
the speed of clot formation, and the quality and stability of the clot. Viscoelastic tests h
coagulation therapy according to the actual needs of each patient, reducing the
The concept of early, individualized and goal-directed therapy is explored
Hospital algorithm for managing trauma-induced coagulopathy is

Keywords: ROTEM, TEG, trauma, goal-directed coagulati

Introduction

Major brain injury and unco
the primary causes o
[1-3]. One-quar
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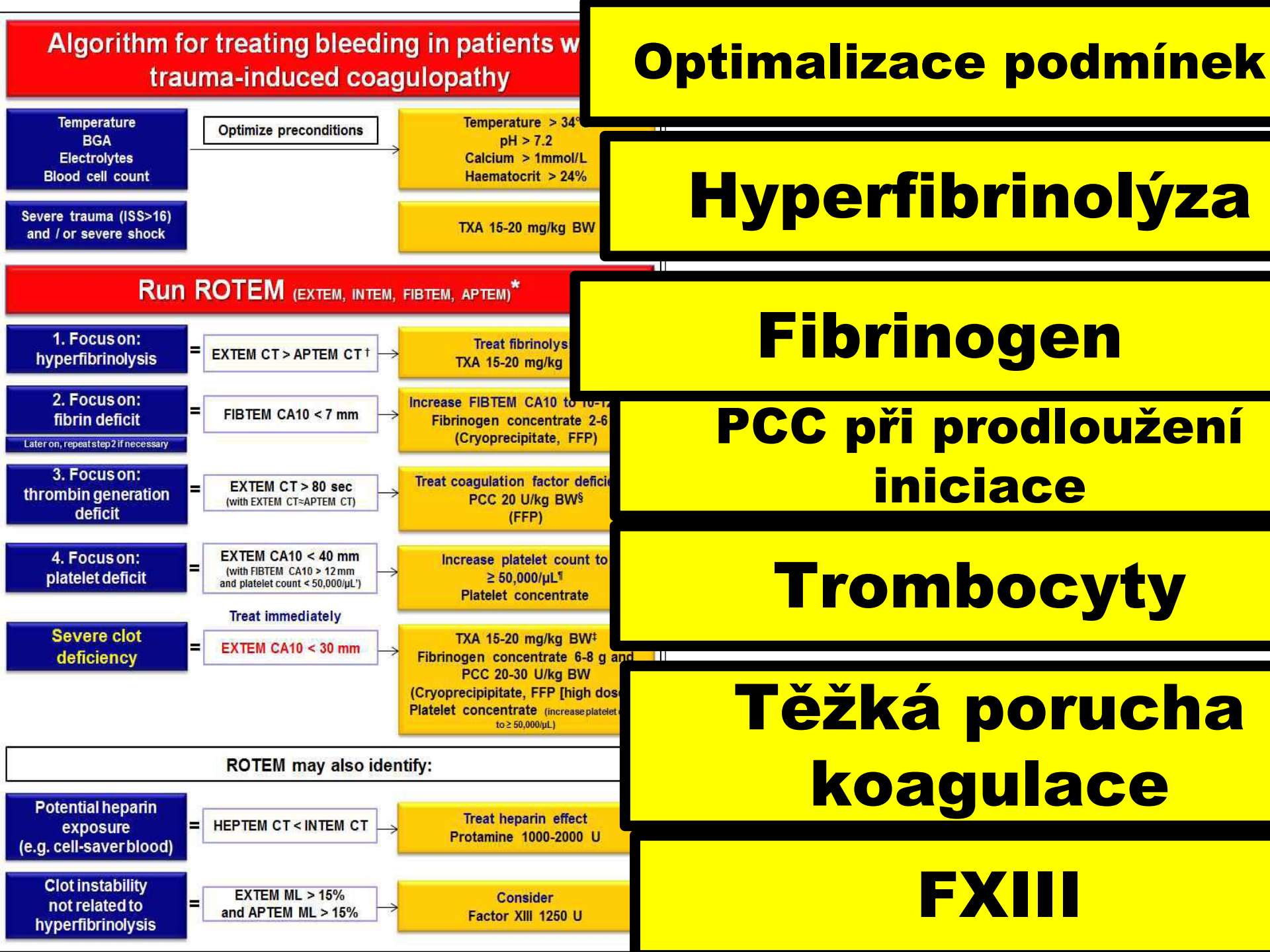
bela
MA,

cells
stasis [11].
ied using plasma
hese are removed by cen-
tests are stopped upon forma-
fibrin strands, when only ~5% of the
rbin has been generated [12]. Moreover, these
ts do not assess the quality/the strength of the clot.

* Correspo
[1]Ludwig Bo
Vienna, Austri
Full list of auth

AUVA PROTOKOL

Na našem pracovišti je od poloviny roku 2013 používán AUVA protokol v léčbě život ohrožujícího krvácení, vytvořený v Trauma hospital Salzburg, Austria.


Algorithm for treating bleeding in patients w
trauma-induced coagulopathy
Temperature
BGA
Electrolytes
Blood cell count
Optimize preconditions
Temperature > 34°
pH > 7.2
Calcium > 1mmol/L
Haematocrit > 24%
Severe trauma (ISS>16)
and / or severe shock
TXA 15-20 mg/kg BW
Run ROTEM (EXTEM, INTEM, FIBTEM, APTEM)*
1. Focus on:
hyperfibrinolysis
=
EXTEM CT > APTEM CT†
Treat fibrinolys
TXA 15-20 mg/kg
2. Focus on:
fibrin deficit
Later on, repeat step 2 if necessary
=
FIBTEM CA10 < 7 mm
Increase FIBTEM CA10 to
Fibrinogen concentrate 2-6
(Cryoprecipitate, FFP)
3. Focus on:
thrombin generation
deficit
=
EXTEM CT > 80 sec
(with EXTEM CT≈APTEM CT)
Treat coagulation factor defici
PCC 20 U/kg BW§
(FFP)
4. Focus on:
platelet deficit
=
EXTEM CA10 < 40 mm
(with FIBTEM CA10 > 12 mm
and platelet count < 50,000/µL')
Increase platelet count to
≥ 50,000/µL¶
Platelet concentrate
Treat immediately
Severe clot
deficiency
=
EXTEM CA10 < 30 mm
TXA 15-20 mg/kg BW‡
Fibrinogen concentrate 6-8 g and
PCC 20-30 U/kg BW
(Cryoprecipipitate, FFP [high dos
Platelet concentrate (increase platelet
to ≥ 50,000/µL)
ROTEM may also identify:
Potential heparin
exposure
(e.g. cell-saver blood)
=
HEPTEM CT < INTEM CT
Treat heparin effect
Protamine 1000-2000 U
Clot instability
not related to
hyperfibrinolysis
=
EXTEM ML > 15%
and APTEM ML > 15%
Consider
Factor XIII 1250 U
Optimalizace podmínek
Hyperfibrinolýza
Fibrinogen
PCC při prodloužení
iniciace
Trombocyty
Těžká porucha
koagulace
FXIII

F XIII

Spahn et al. Critical Care 2013, 17:R76
http://ccforum.com/content/17/2/R76

CRITICAL CARE

RESEARCH Open Access

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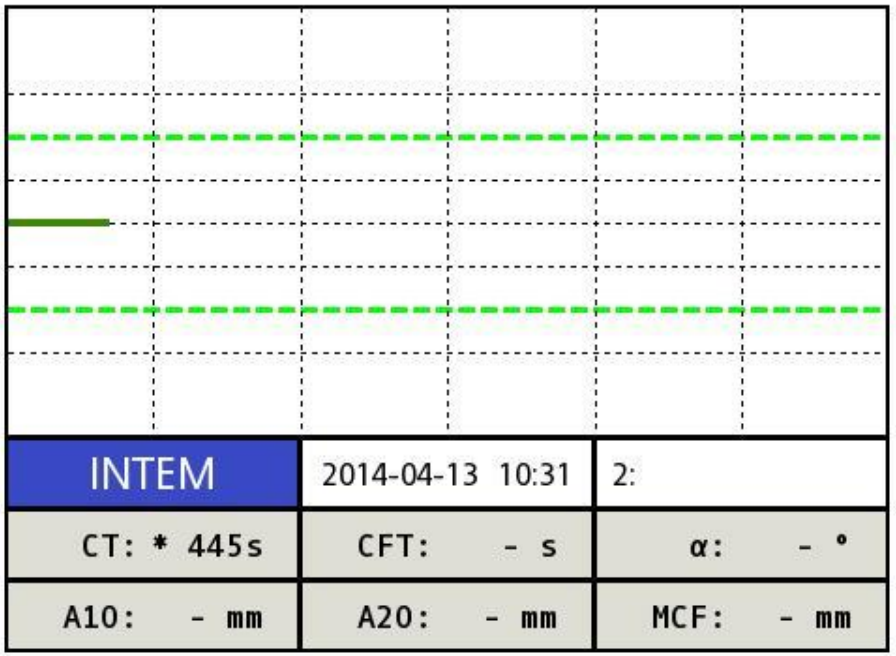
- In cases of ongoing or diffuse bleeding and low clot strength despite adequate fibrinogen concentrations, it is likely that FXIII activity is critically reduced. In cases of signifi
deficiency (i.e. <60%
concen

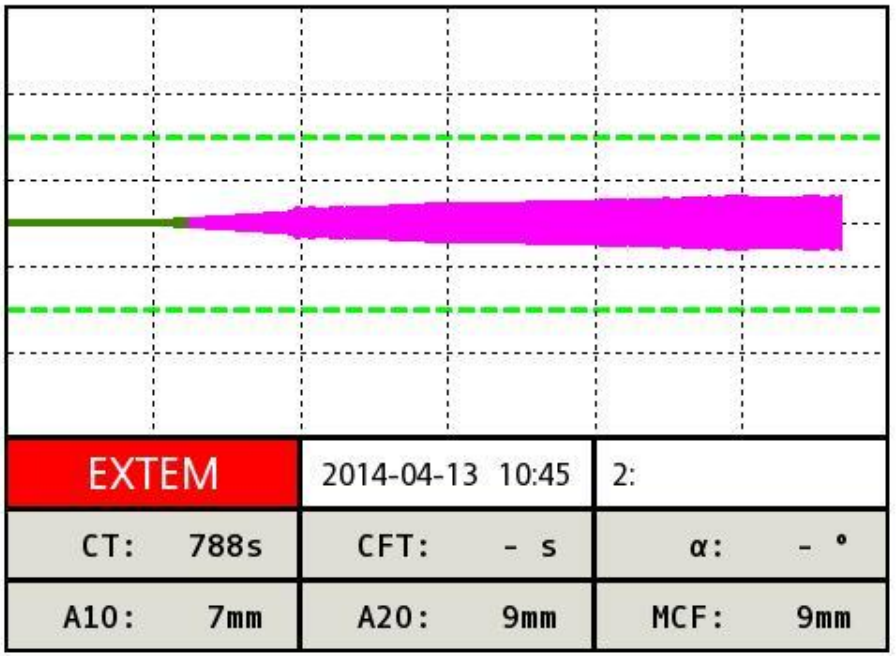
Vyšetření dostupné : 24/7
Koncentrát dostupný/zatím nepodán

Kasuistika - PPH

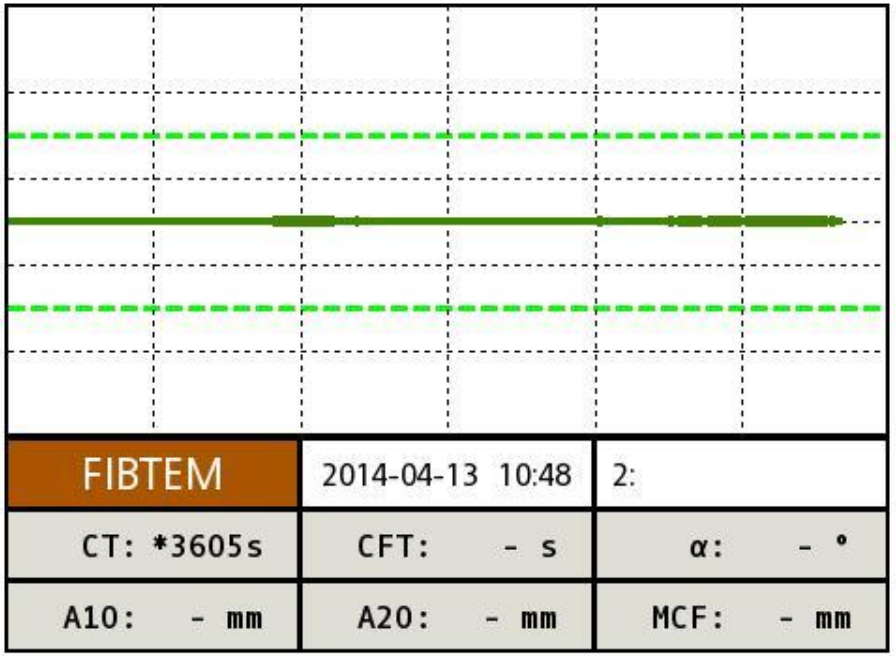
melkova 1



INTEM	2014-04-13 10:31	2:
CT: * 445s	CFT: - s	α: - °
A10: - mm	A20: - mm	MCF: - mm

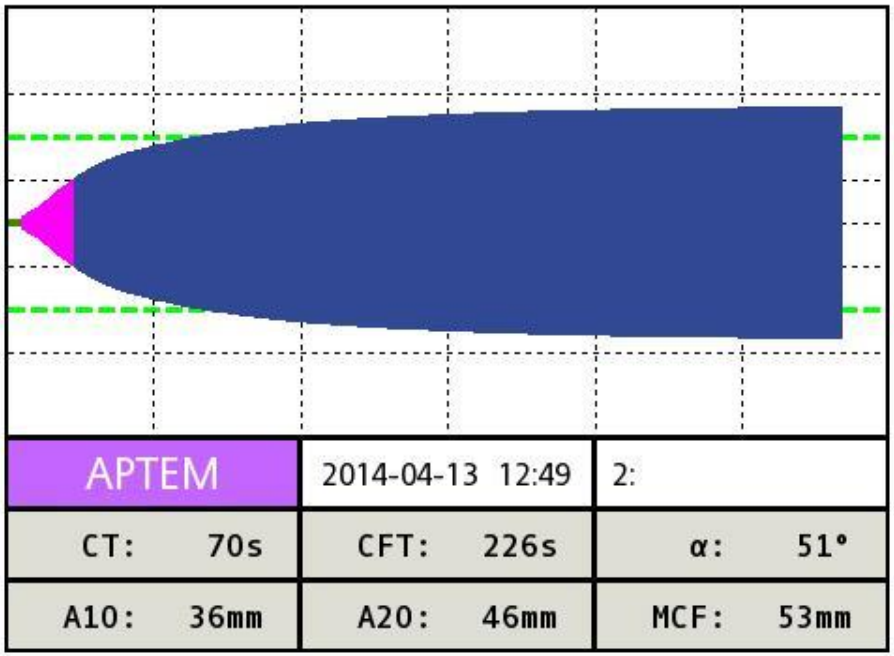


EXTEM	2014-04-13 10:45	2:
CT: 788s	CFT: - s	α: - °
A10: 7mm	A20: 9mm	MCF: 9mm

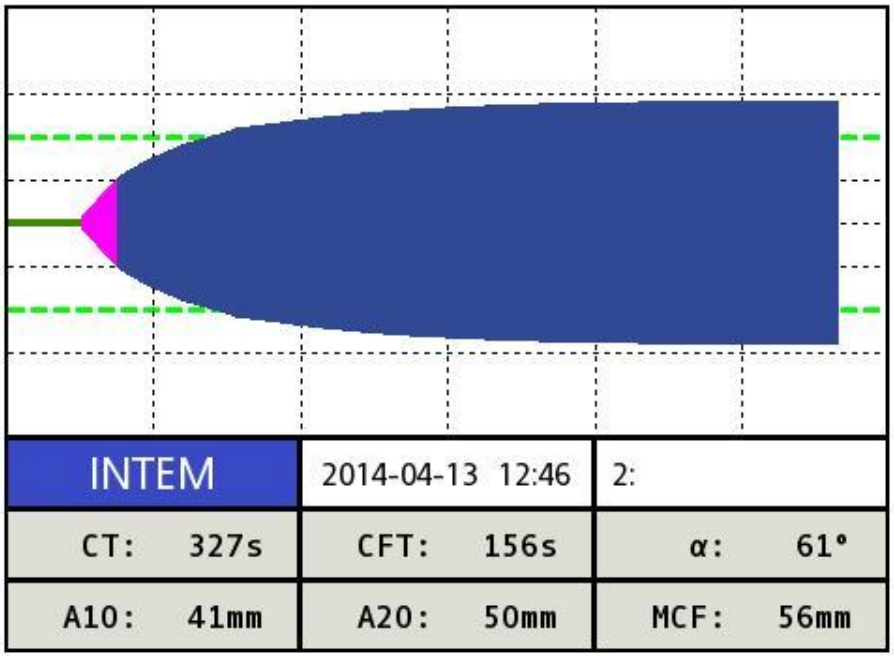


FIBTEM	2014-04-13 10:48	2:
CT: *3605s	CFT: - s	α: - °
A10: - mm	A20: - mm	MCF: - mm

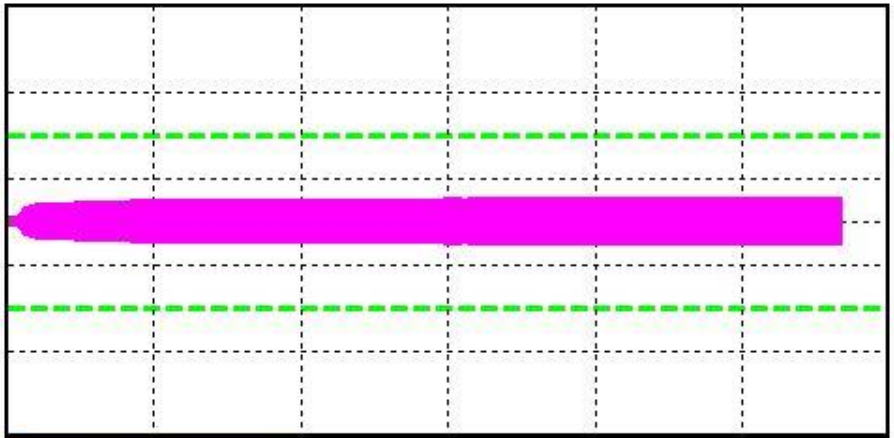
melkova 3a



APTEM	2014-04-13 12:49	2:
CT: 70s	CFT: 226s	α: 51°
A10: 36mm	A20: 46mm	MCF: 53mm



INTEM	2014-04-13 12:46	2:
CT: 327s	CFT: 156s	α: 61°
A10: 41mm	A20: 50mm	MCF: 56mm

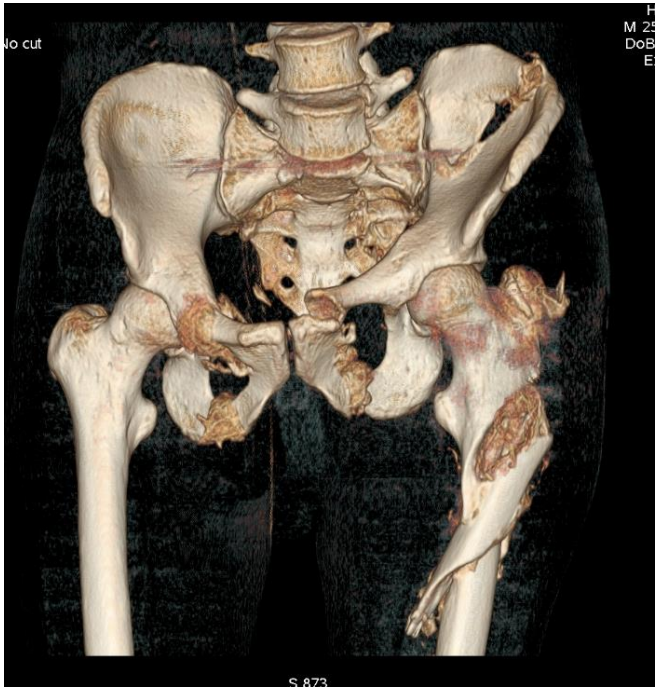


FIBTEM	2014-04-13 12:48	2:
CT: 22s	CFT: - s	α: 47°
A10: 10mm	A20: 10mm	MCF: 10mm

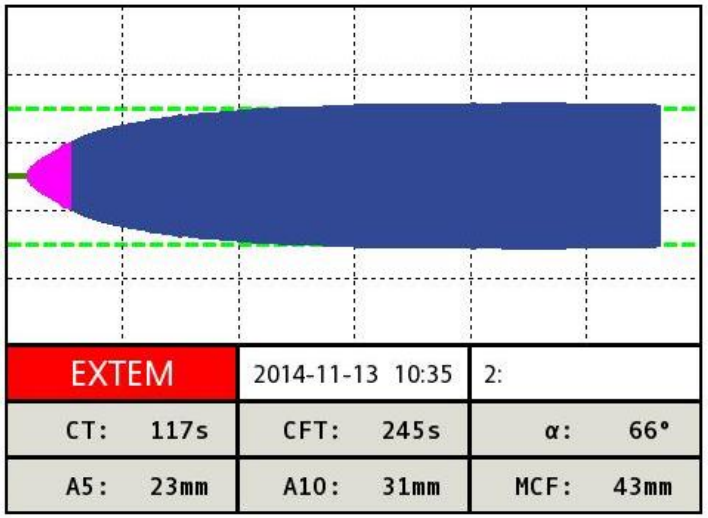
TXA 1500 mg
Fibrinogen 10 g
PCC 2500 i.u.
1 j. Trombo
5 x PRBC

kazuistika trauma

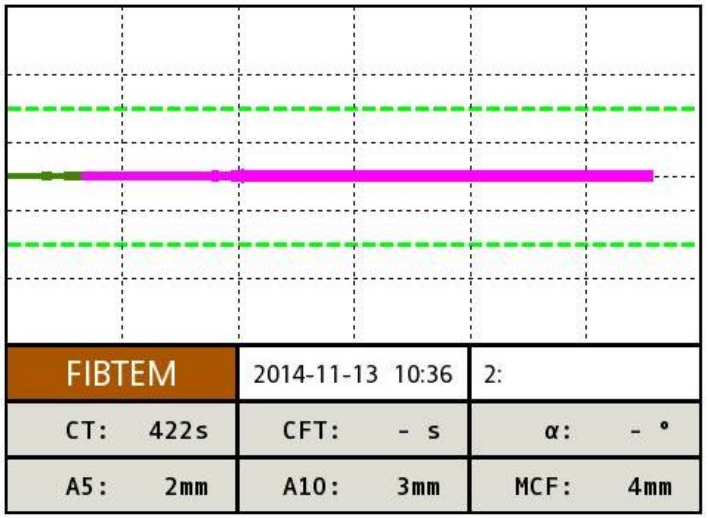
- **Muž 30 let**
- **Pád z výšky na hlavu, z 2. patra**
- **SDH FTP l.sin., rruptura sleziny, fr. pánve, fr. colli fem.**



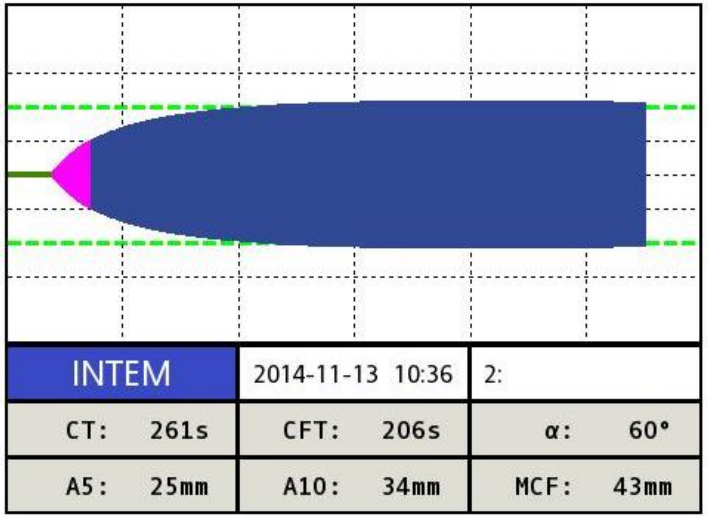
kazuistika trauma



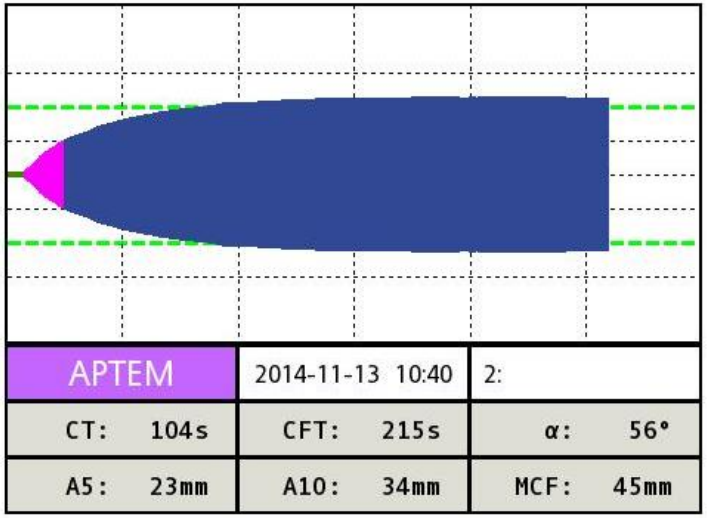
EXTEM	2014-11-13 10:35	2:
CT: 117s	CFT: 245s	α: 66°
A5: 23mm	A10: 31mm	MCF: 43mm



FIBTEM	2014-11-13 10:36	2:
CT: 422s	CFT: - s	α: - °
A5: 2mm	A10: 3mm	MCF: 4mm

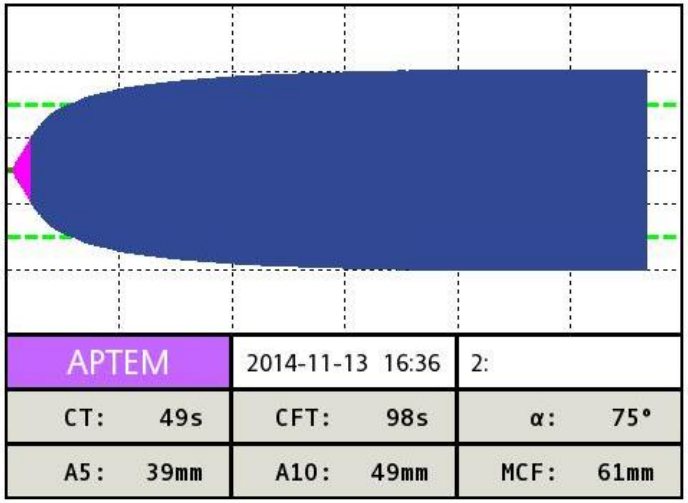


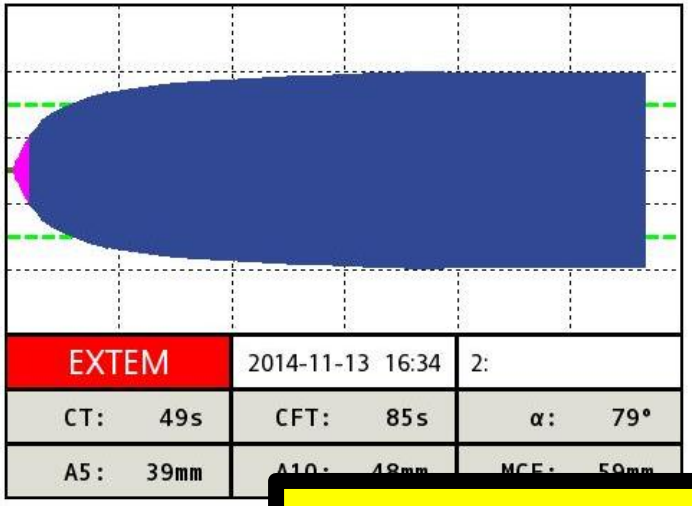
INTEM	2014-11-13 10:36	2:
CT: 261s	CFT: 206s	α: 60°
A5: 25mm	A10: 34mm	MCF: 43mm

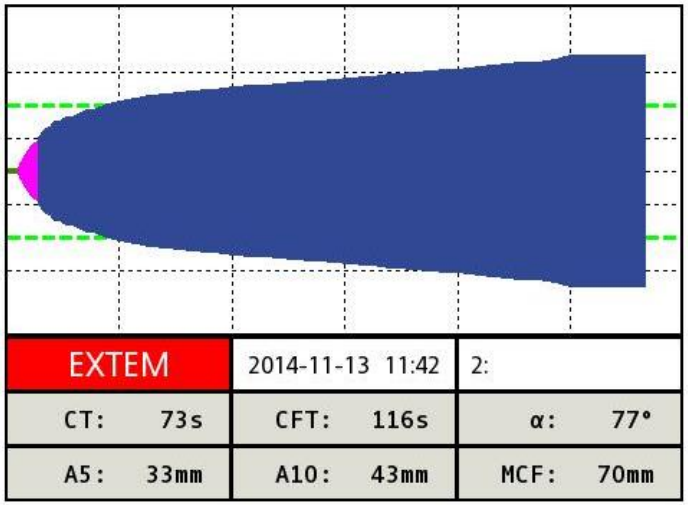


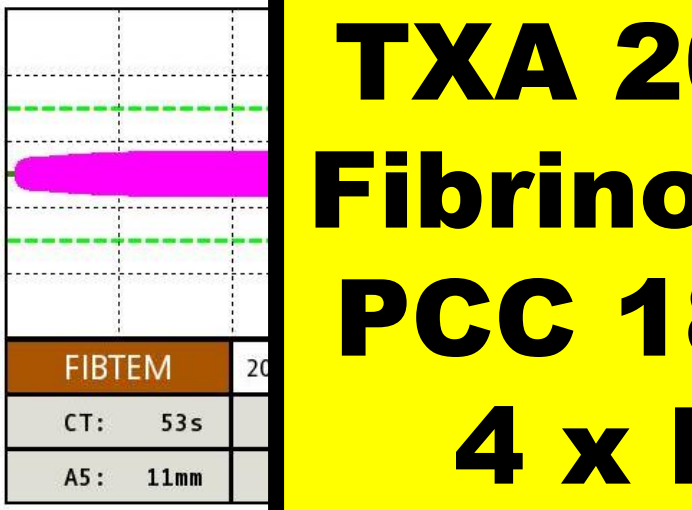
APTEM	2014-11-13 10:40	2:
CT: 104s	CFT: 215s	α: 56°
A5: 23mm	A10: 34mm	MCF: 45mm

kazuistika trauma





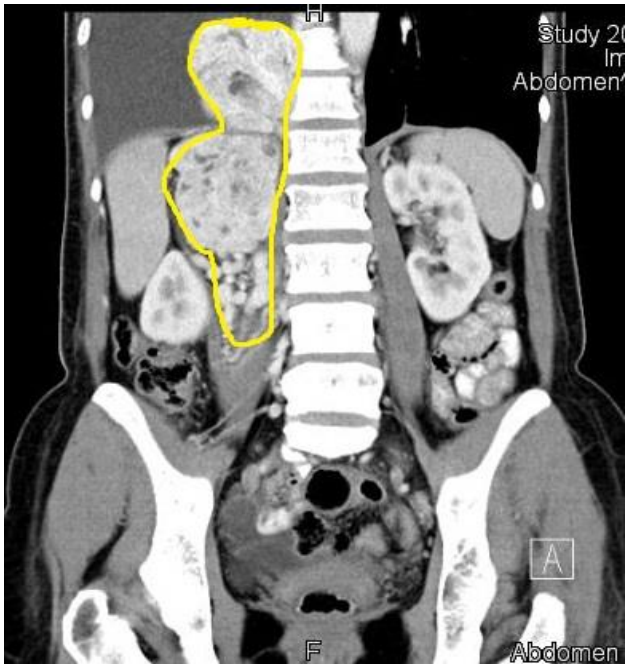


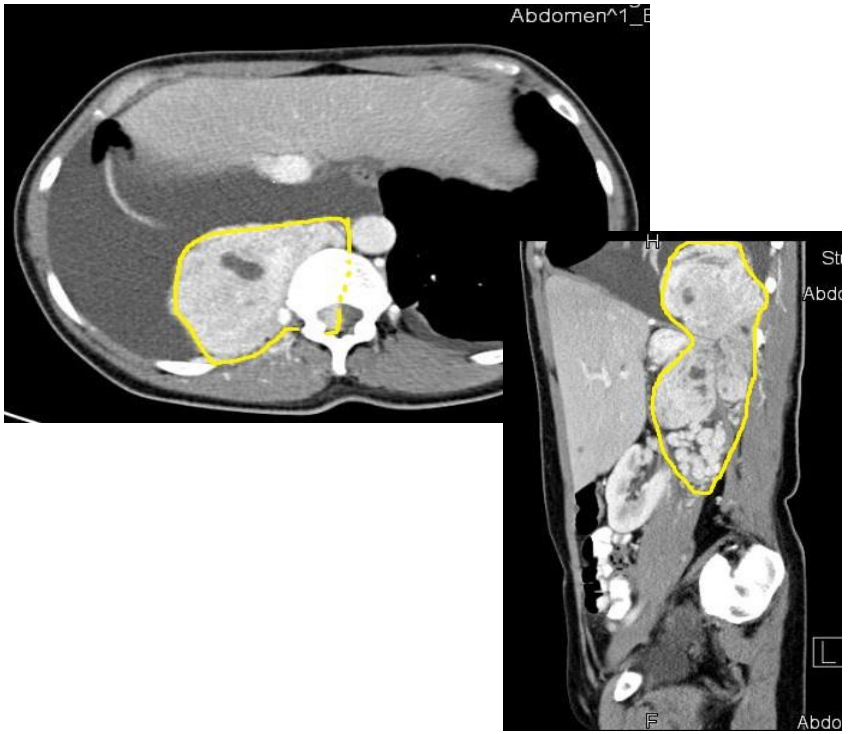


TXA 2000 mg
Fibrinogen 8 g
PCC 1800 i.u.
4 x PBRC

elektivní operace

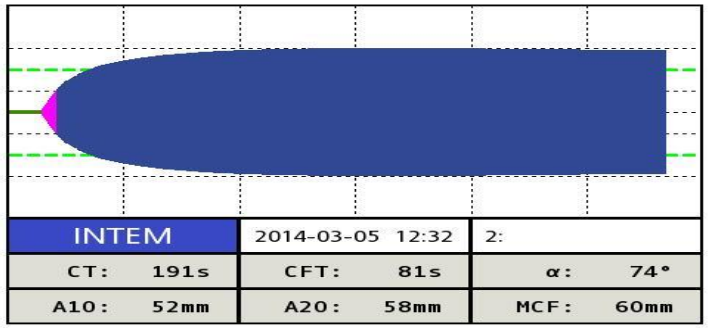
- **Fibrozní tumor prorůstající z mediastina do retroperitonea**
- **2 plánované operace**



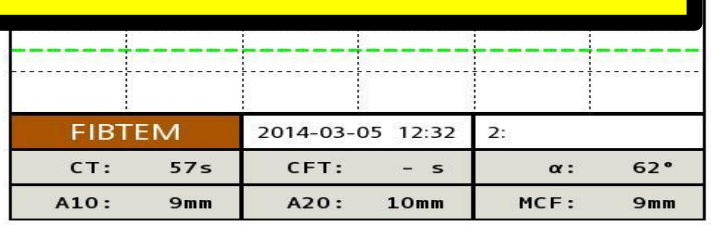


1. operace

TXA 1000 mg
Fibrinogen 6 g
1 x trombo
6 x PRBC



INTEM	2014-03-05 12:32	2:
CT: 191s	CFT: 81s	α: 74°
A10: 52mm	A20: 58mm	MCF: 60mm

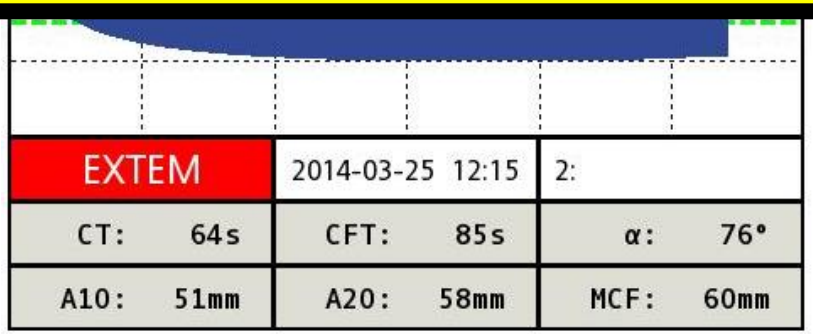


FIBTEM	2014-03-05 12:32	2:
CT: 57s	CFT: - s	α: 62°
A10: 9mm	A20: 10mm	MCF: 9mm

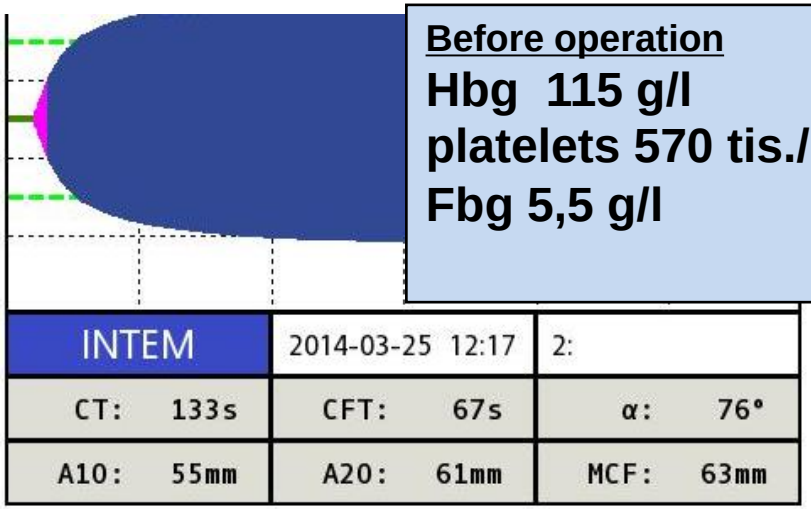
Krevní ztráta 6300 ml

erace

Fibrinogen 4 g
11 x PRBC

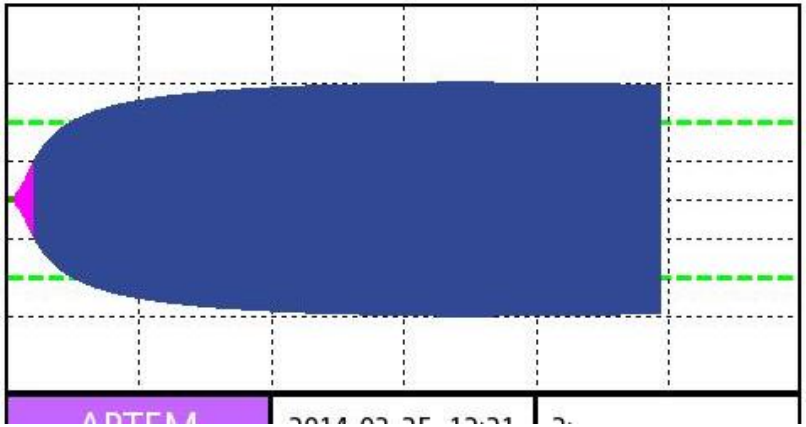


EXTEM	2014-03-25 12:15	2:
CT: 64s	CFT: 85s	α: 76°
A10: 51mm	A20: 58mm	MCF: 60mm



INTEM	2014-03-25 12:17	2:
CT: 133s	CFT: 67s	α: 76°
A10: 55mm	A20: 61mm	MCF: 63mm

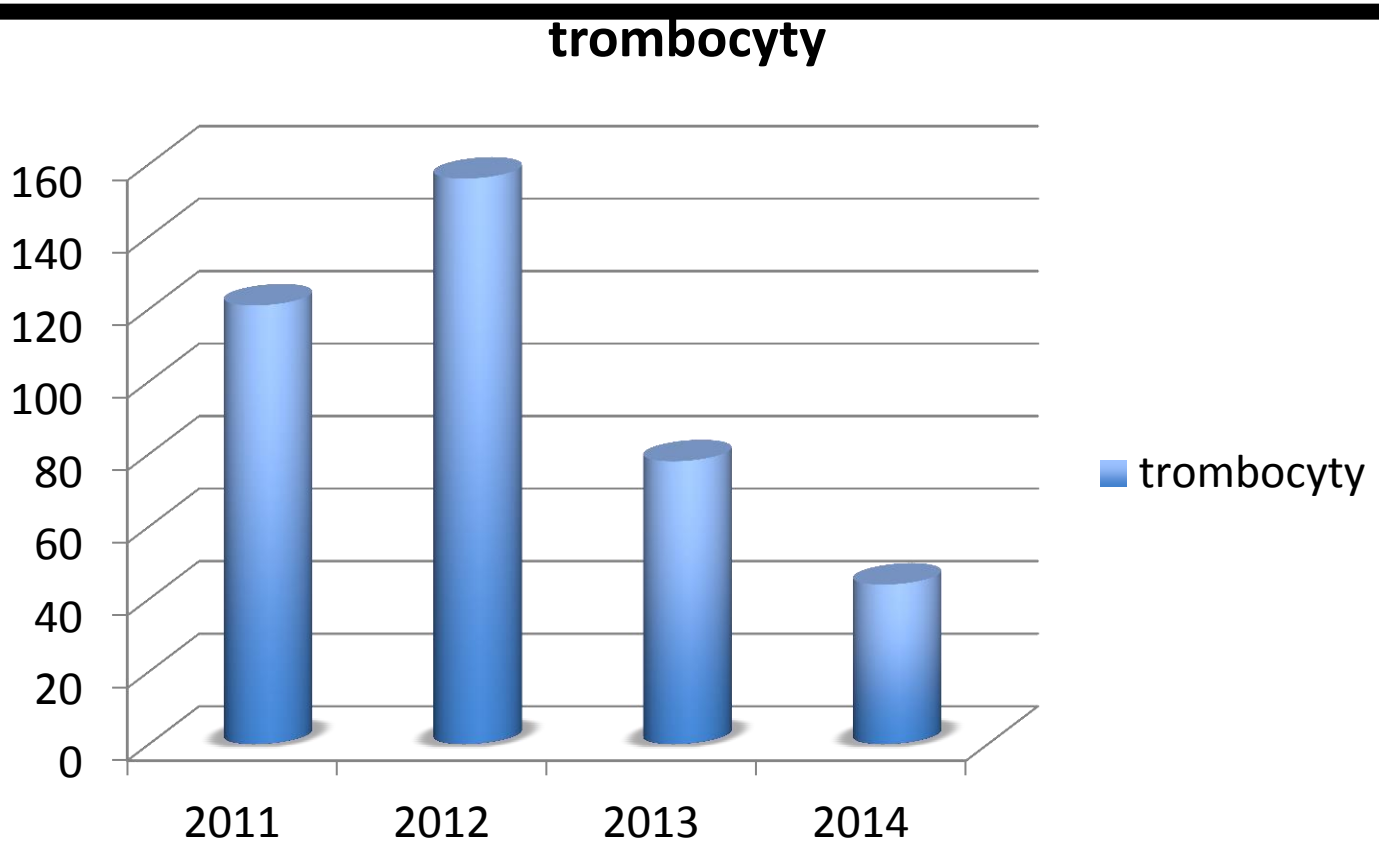
Before operation
Hbg 115 g/l
platelets 570 tis./µl
Fbg 5,5 g/l



Krevní ztráta 7500 ml

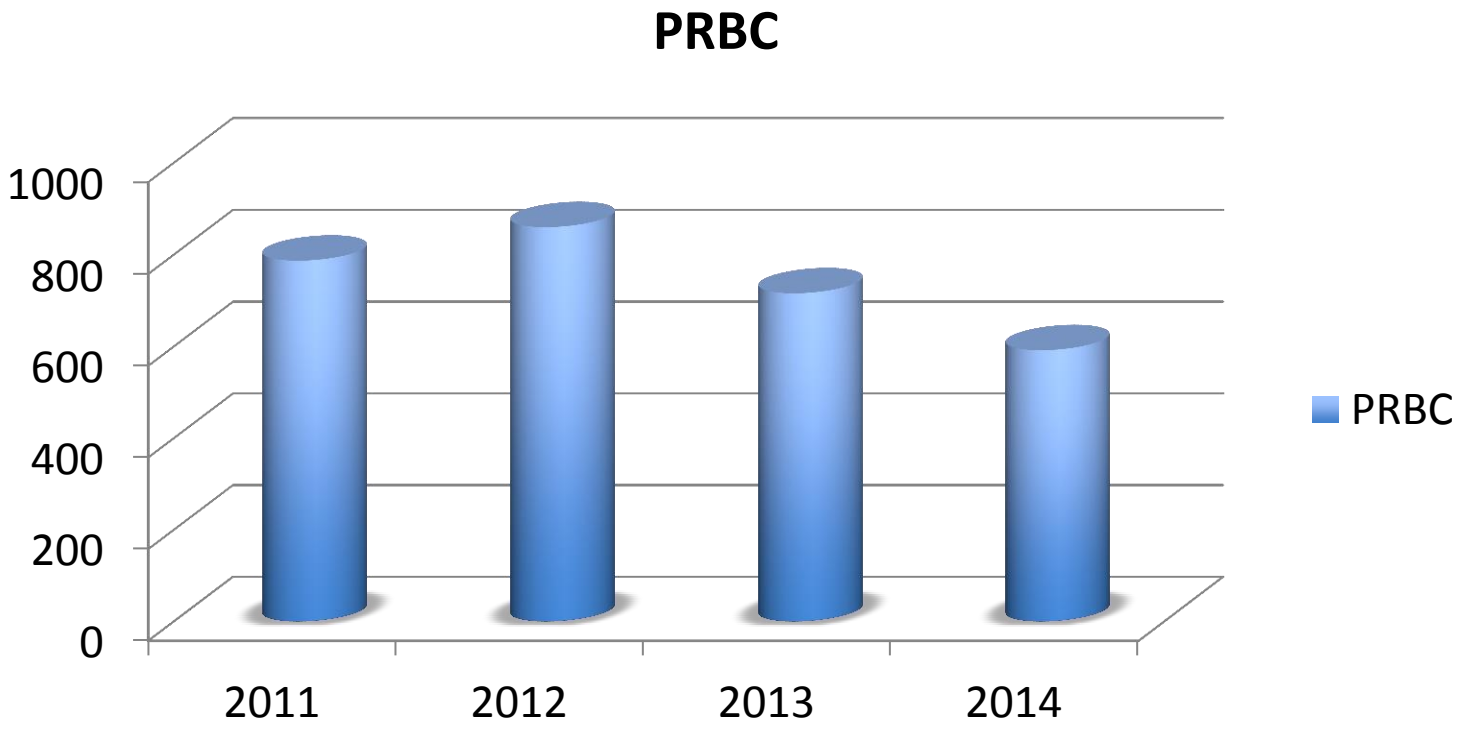
předběžná data

trombocyty



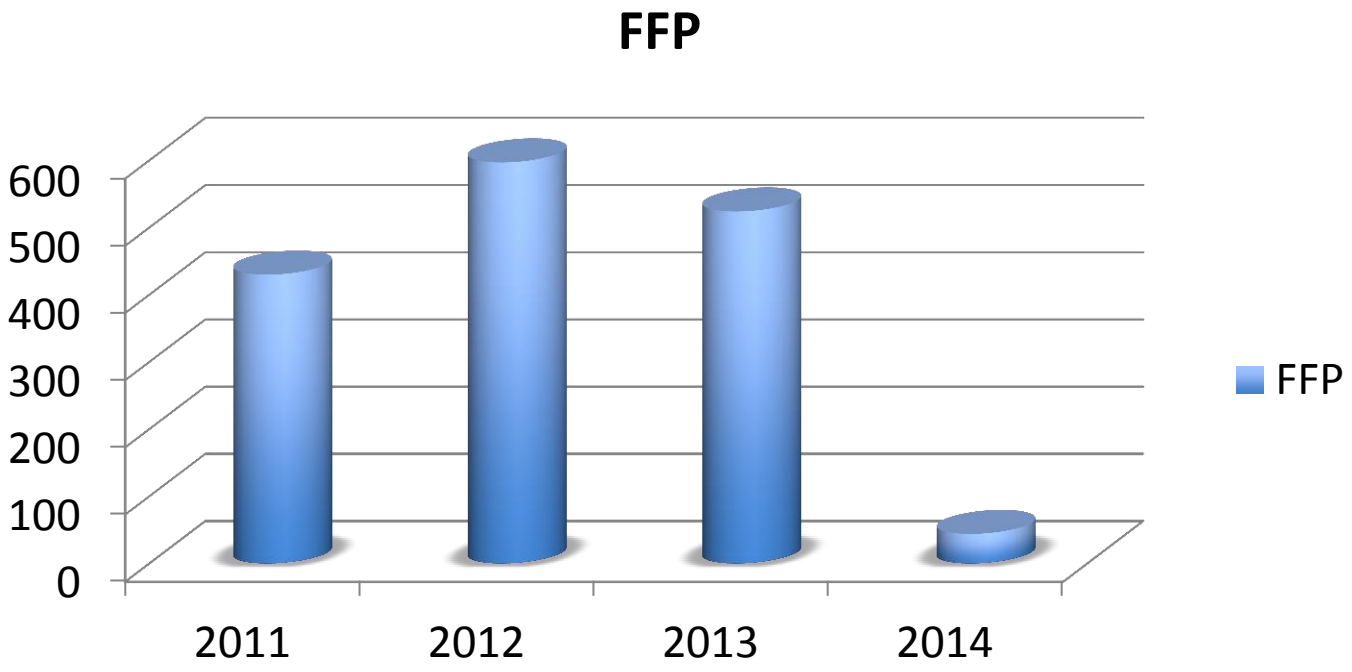
Pokles o 44 %

PRBC



Pokles o 18 %

FFP



Pokles o více než 90%

Závěr

léčba krvácení: časná, rychlá, cílená

„one size does not fit all“

„masivní transfuzní protokol a podávání plasmy je lepší než nic“

nutná je implementace časného POC testování

implementace léčebného algoritmu je nutná (a přináší pokles nákladů)

děkuji za pozornost

Pozvánka na

KURZ POUŽITÍ ROTAČNÍ TROMBELASTOMETRIE V PERIOPERAČNÍ A INTENZIVNÍ MEDICÍNĚ

Krajská nemocnice Liberec, a.s.
Liberec a Turnov

Anesteziologicko - resuscitační oddělení Krajské nemocnice Liberec, a.s. si Vás dovoluje pozvat na workshop praktického použití rotační trombelastometrie v perioperační a intenzivní medicíně.

Nyní v termínech 24.3.2015 a 21.4.2015

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Těšíme se na vás