In collaboration with NATA:

We want it quick and we want it now!

Bloody perioperative case scenarios: Vote for personalized care

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EVANGELISCHES KRANKENHAUS
Tradition seit 1901

Which statement is correct?

15% 1. PBM = **P**erioperative severe **B**leeding **M**anagement

2% 2. POB = **P**atient-**o**riented **B**estseller

84% 3. NATA = **N**etwork of **A**dvancement of **T**ransfusion **A**lternatives

0% 4. ESA = **E**uropean **S**ociety of **A**llergologists

Disclosure of potential conflicts of interest

honoraria for lectures & consulting, travel reimbursement:

Baxter
B. Braun
Biotest
Boehringer Ingelheim
CSL Behring
Fresenius Kabi
Mitsubishi Pharma
Novo Nordisk
Octapharma
Pfizer
TEM International
Verum Diagnostics

Definitions of PeriOperative Bleeding

- minimal
- severe
  - > 20% blood volume
- life-, organ-
  - e.g. intra
- mas
  - loss in 24 h
  - lood loss in 3 h
  - 0 ml/min in 20 mins
  - > 1.5 ml/kg/min in 20 mins
  - > 6 U PRBC in 24 h

therapy is more than just a reflex of 1:1 plus cryo

Severe POB

emergency

risk factor for anaemia

risk factor for transfusion

risk factor morbidity/mortality

increases ressource use & costs

Reductions in POB

- ✓ increased patient safety
- ✓ reduced incidence of
  - anaemia
  - allogeneic blood transfusion
  - coagulopathy
  - tissue hypoperfusion

predictors for survival

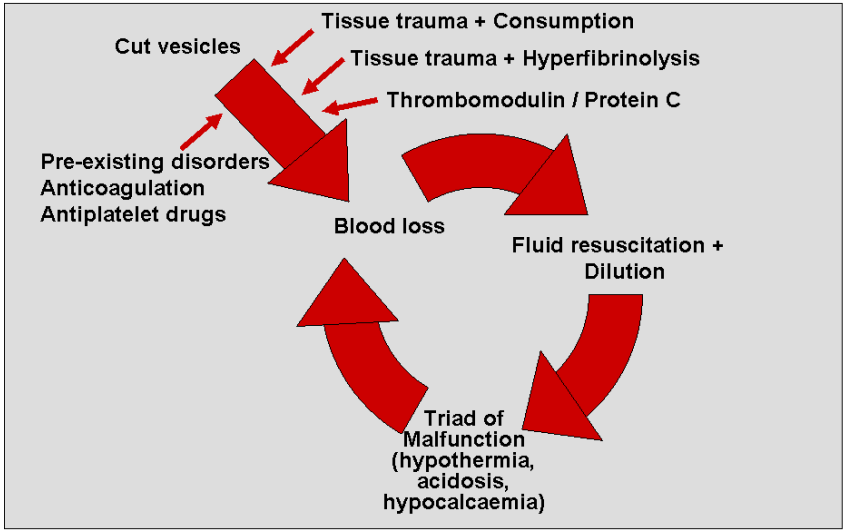
- ✓ job satisfaction, stress tolerance

Contents

- eye-on workshop
- case discussions & voting
- e-tools for daily clinical practice

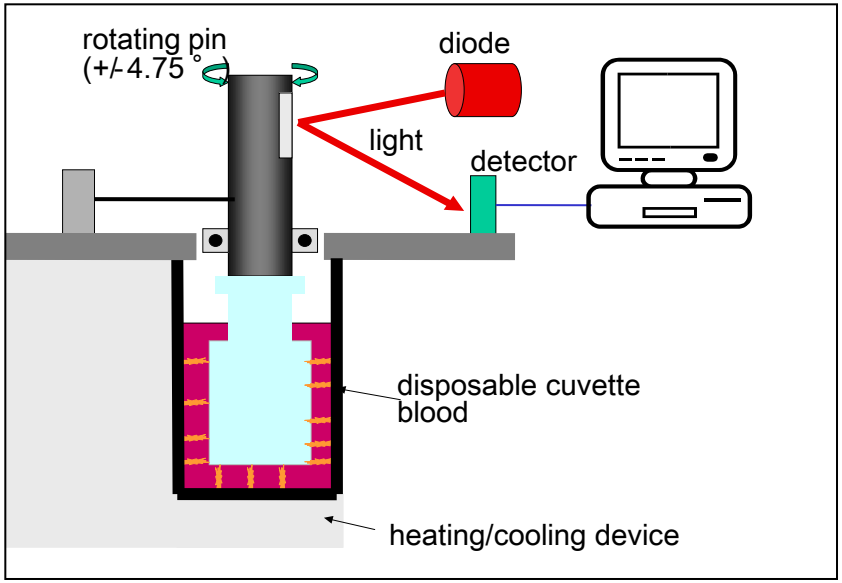
„Time is life!“

Conventional coagulation tests

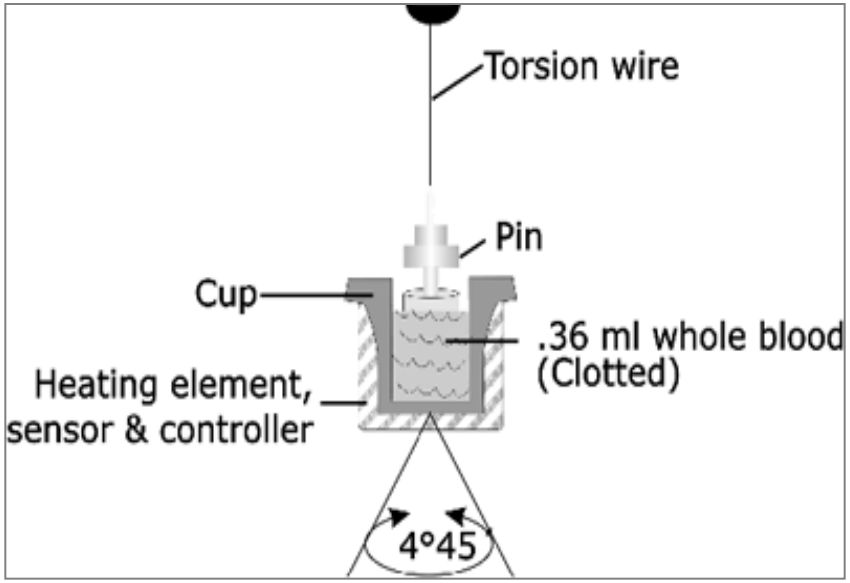


Kozek. In: Yearbook of Intensive Care and Emergency Medicine 2007:847

Viscoelastic POC tests



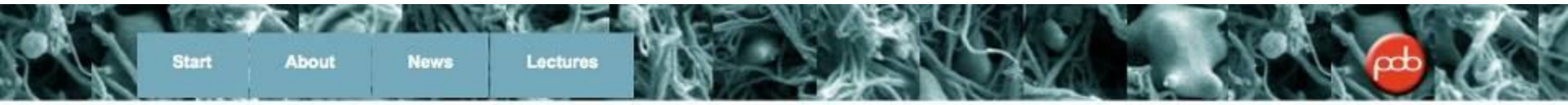
ROTEM® *TEM Innovations*



TEG Analyzer®, *Haemoscope*

Viscoelastic point-of-care tests
ROTEM / TEG

www.perioperativebleeding.org



Algorithm & triggers

We recommend the application of transfusion algorithms incorporating **predefined transfusion triggers** to guide haemostatic intervention during intraoperative bleeding

1B

We recommend the application of transfusion algorithms incorporating predefined transfusion triggers **based on POC coagulation monitoring assays** to guide haemostatic intervention during cardiovascular surgery

1C

Eur J Anaesthesiol 2013; 30: 270-382

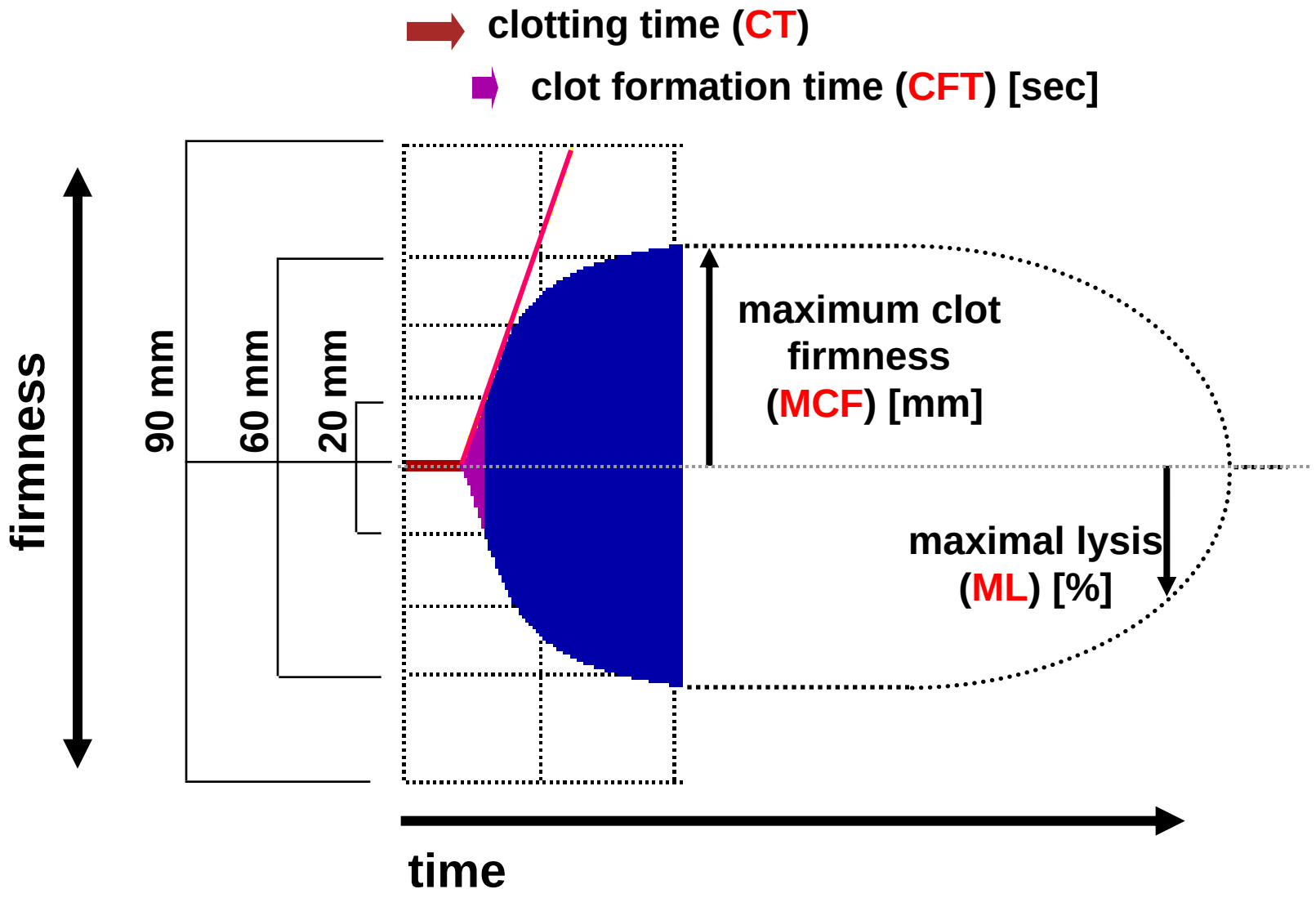
European Society of Anaesthesiology ESA

protocolized care

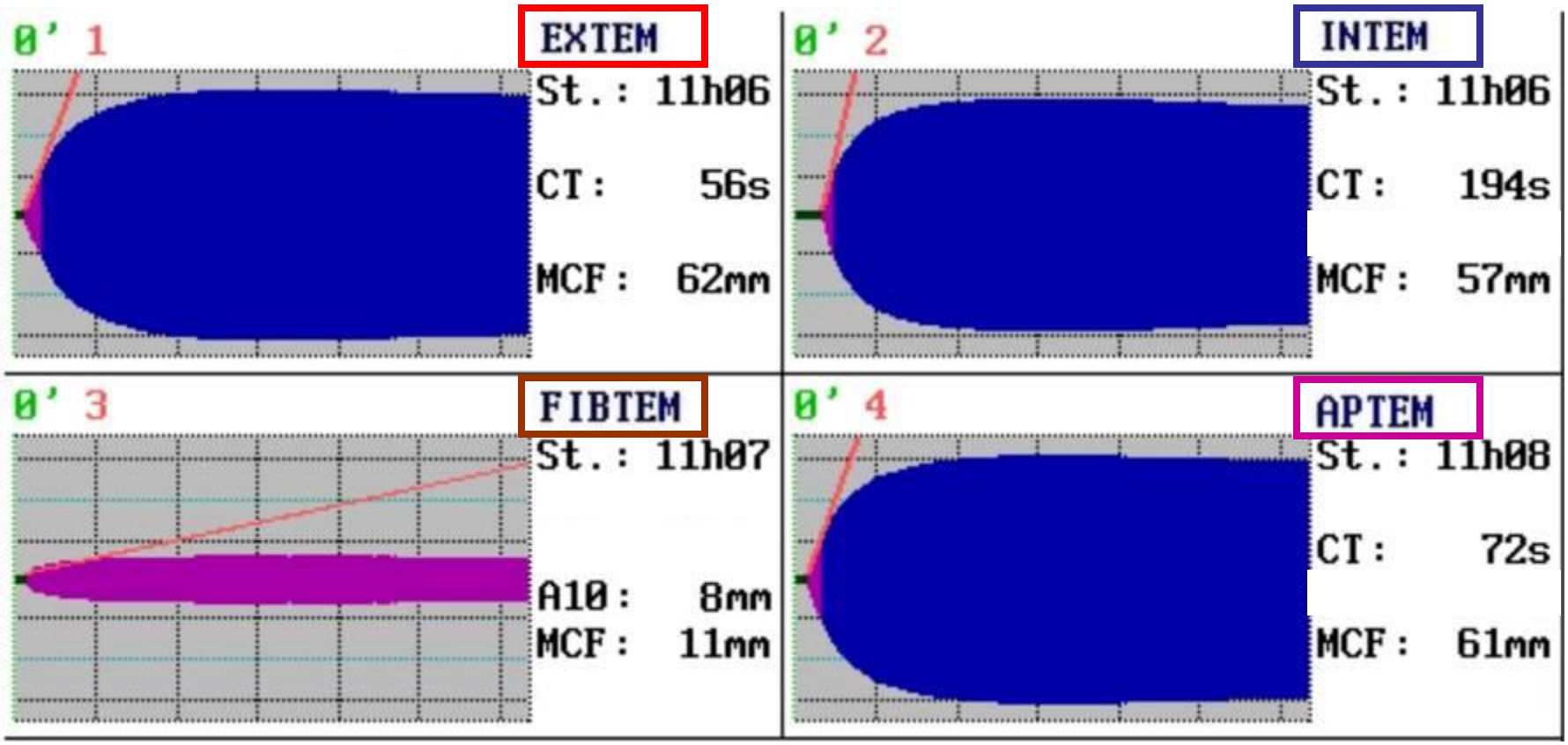
=

personalized care

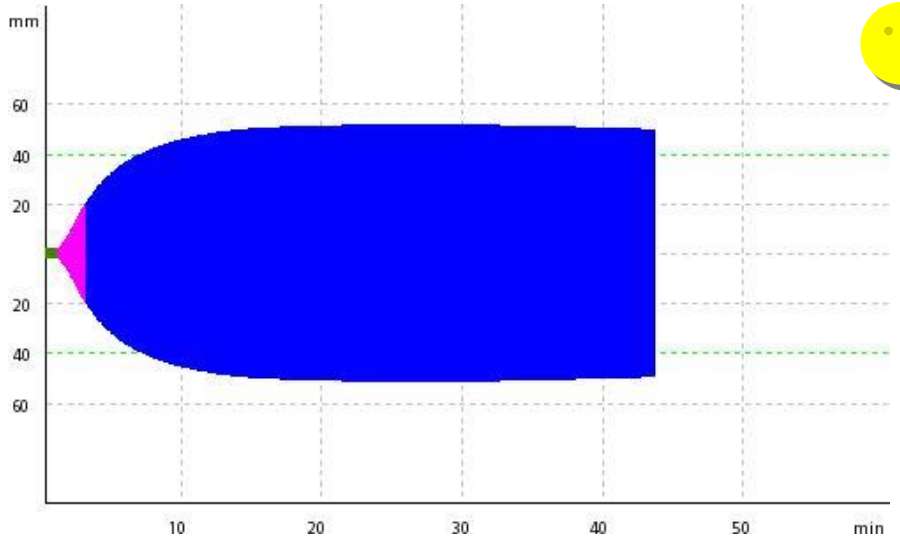
Thromboelastometry ROTEM®



Normal ROTEM traces



What does this ROTEM trace shows us?



59% **1. Normal EXTEM**

25% **2. Normal INTEM**

5% **3. Normal FibTEM**

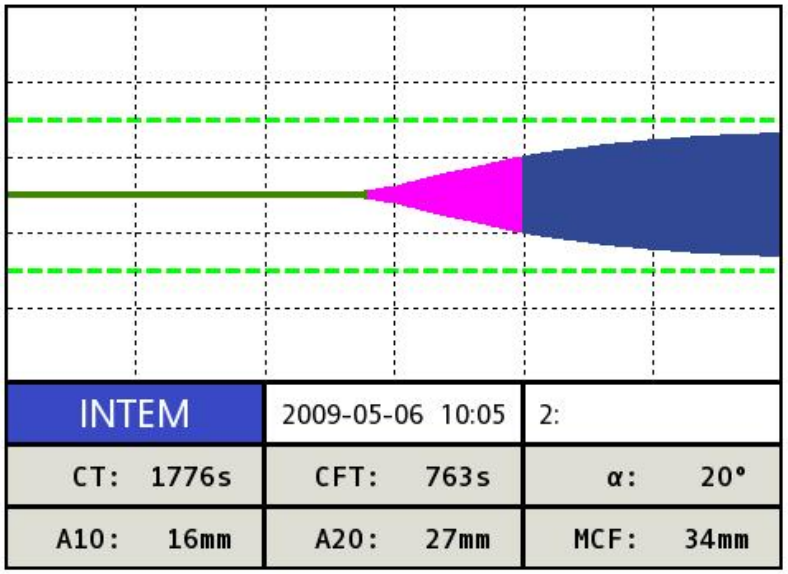
4% **4. Deteriorated HEPTEM**

7% **5. APTEM showing hyperfibrinolysis**

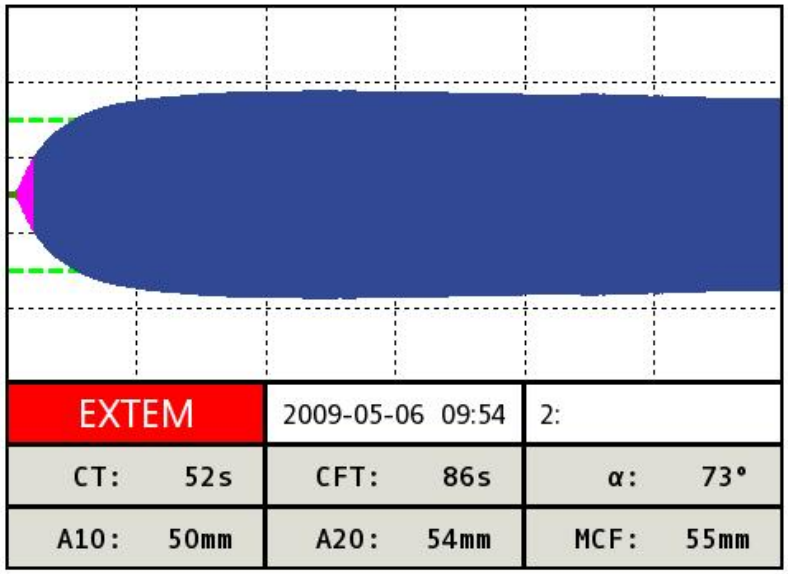
How would the ROTEM trace look like if the patient is on aspirin?

29%	1.	**CT EXTEM prolonged**
28%	2.	**CT INTEM prolonged**
17%	3.	**CT INTEM and EXTEM prolonged**
23%	4.	**No changes of normal tracing**
4%	5.	**CT FIBTEM shortened**

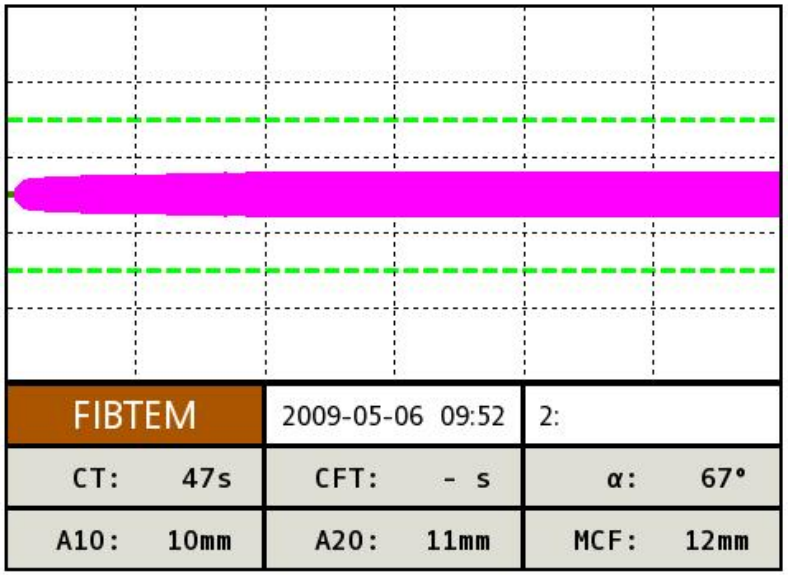
Case 1 - intraoperative data in vascular surgery



INTEM	2009-05-06 10:05	2:
CT: 1776s	CFT: 763s	α: 20°
A10: 16mm	A20: 27mm	MCF: 34mm

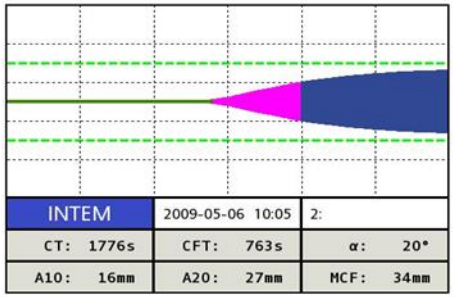


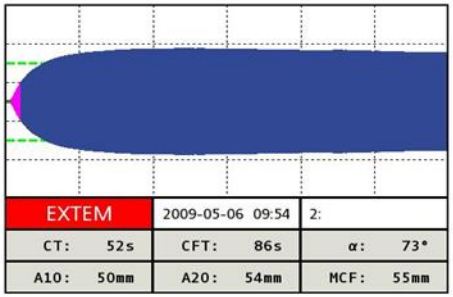
EXTEM	2009-05-06 09:54	2:
CT: 52s	CFT: 86s	α: 73°
A10: 50mm	A20: 54mm	MCF: 55mm

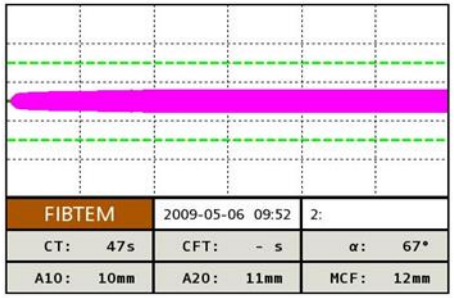


FIBTEM	2009-05-06 09:52	2:
CT: 47s	CFT: - s	α: 67°
A10: 10mm	A20: 11mm	MCF: 12mm

What could be the underlying coagulopathy?

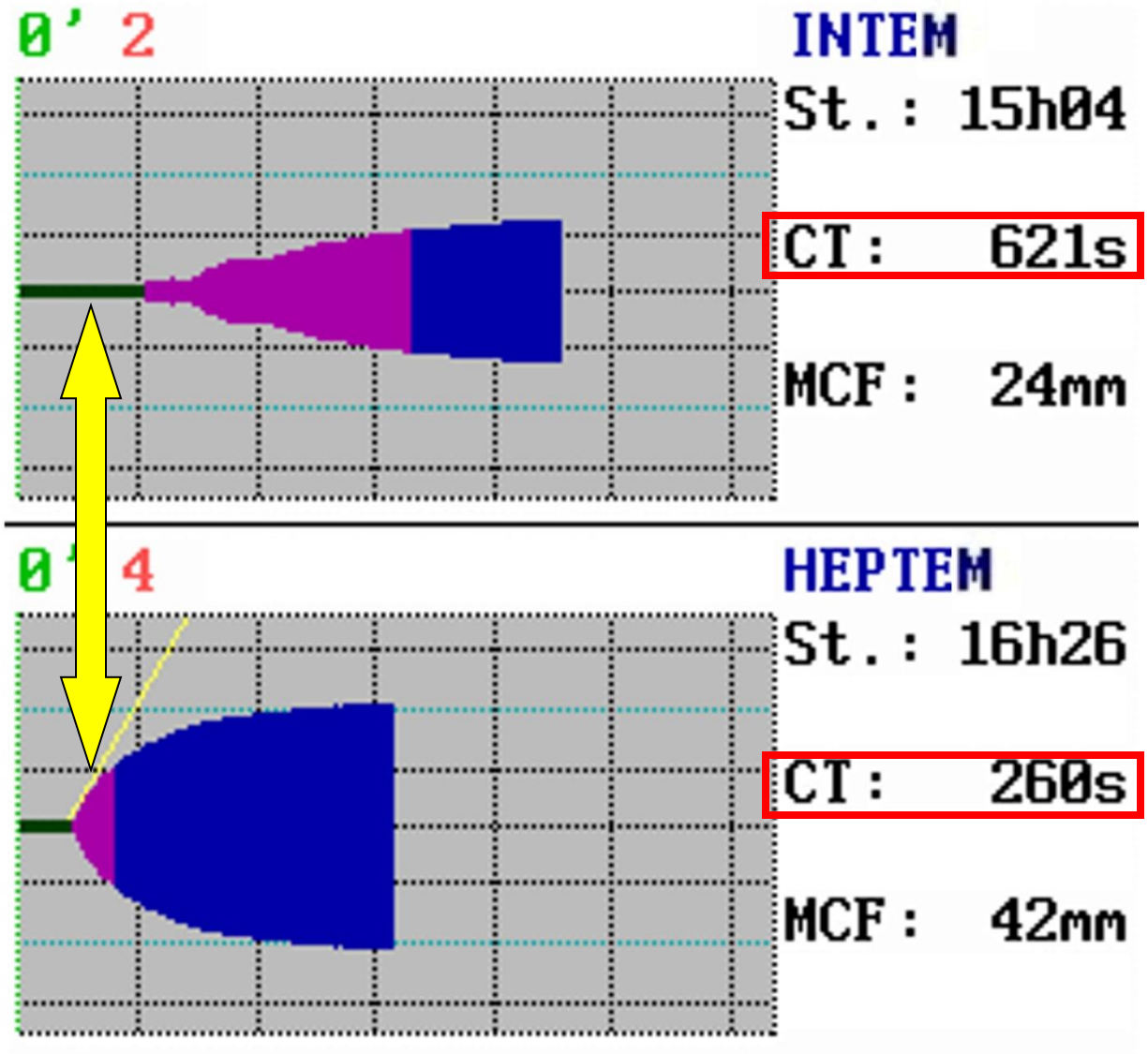




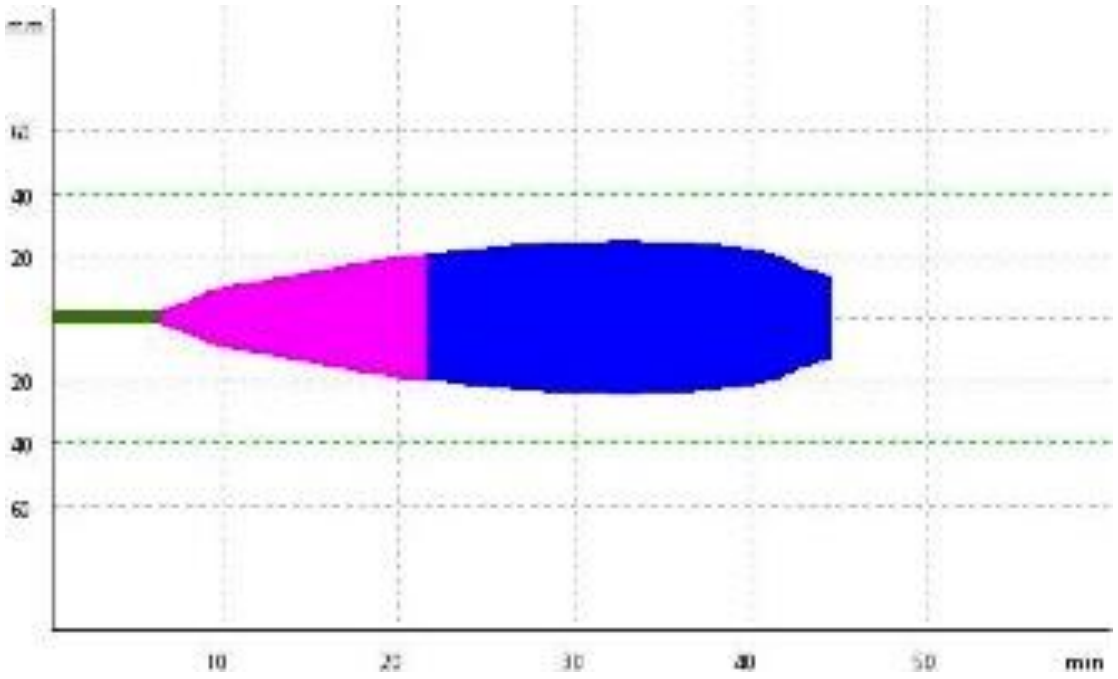


22%	**1.**	**Dilutional coagulopathy**
15%	**2.**	**Low platelet count**
10%	**3.**	**Coumarin therapy**
10%	**4.**	**Hyperfibrinolysis**
42%	**5.**	**Heparin effect**

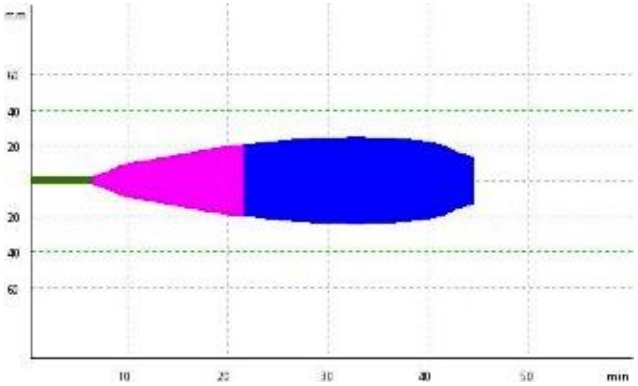
Confirmatory HEPTEM Assay



Case 2 - intraOP data in intracranial surgery



Diffuse bleeding: What is your next step?



34% **1. Administration of TXA**

17% **2. Transfusion of FFP**

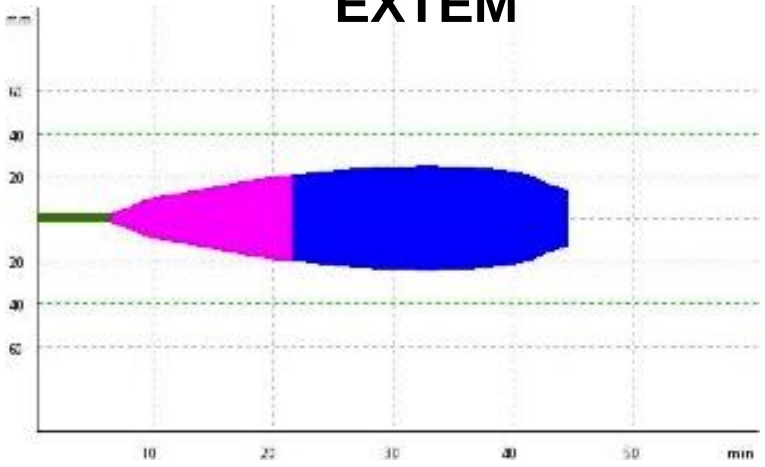
18% **3. Transfusion of cryo**

13% **4. Administration of protamin**

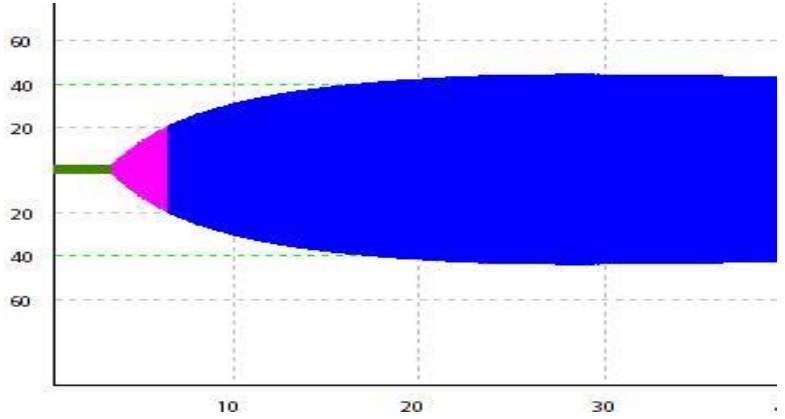
18% **5. Transfusion of platelets**

Confirmatory APTEM Assay

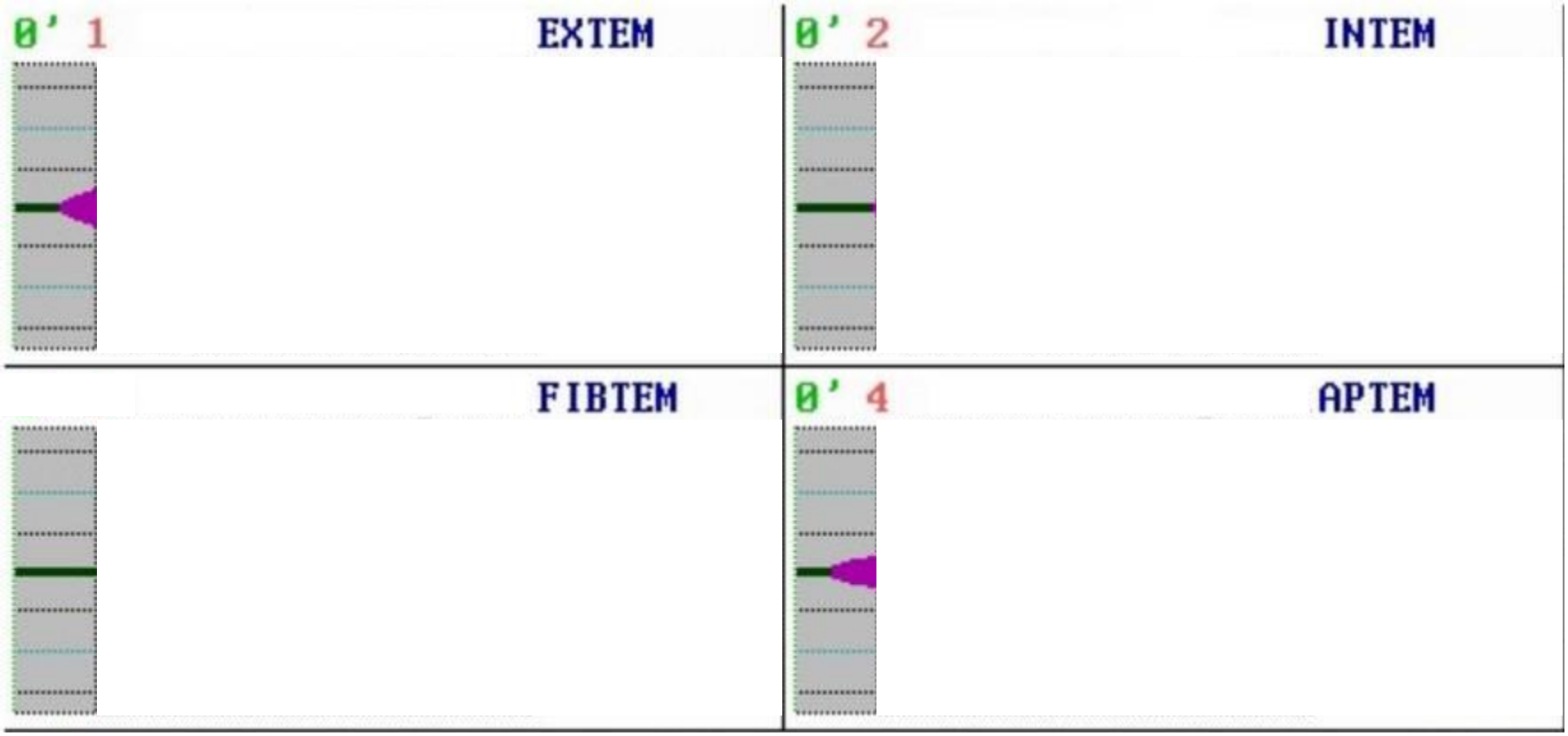
EXTEM



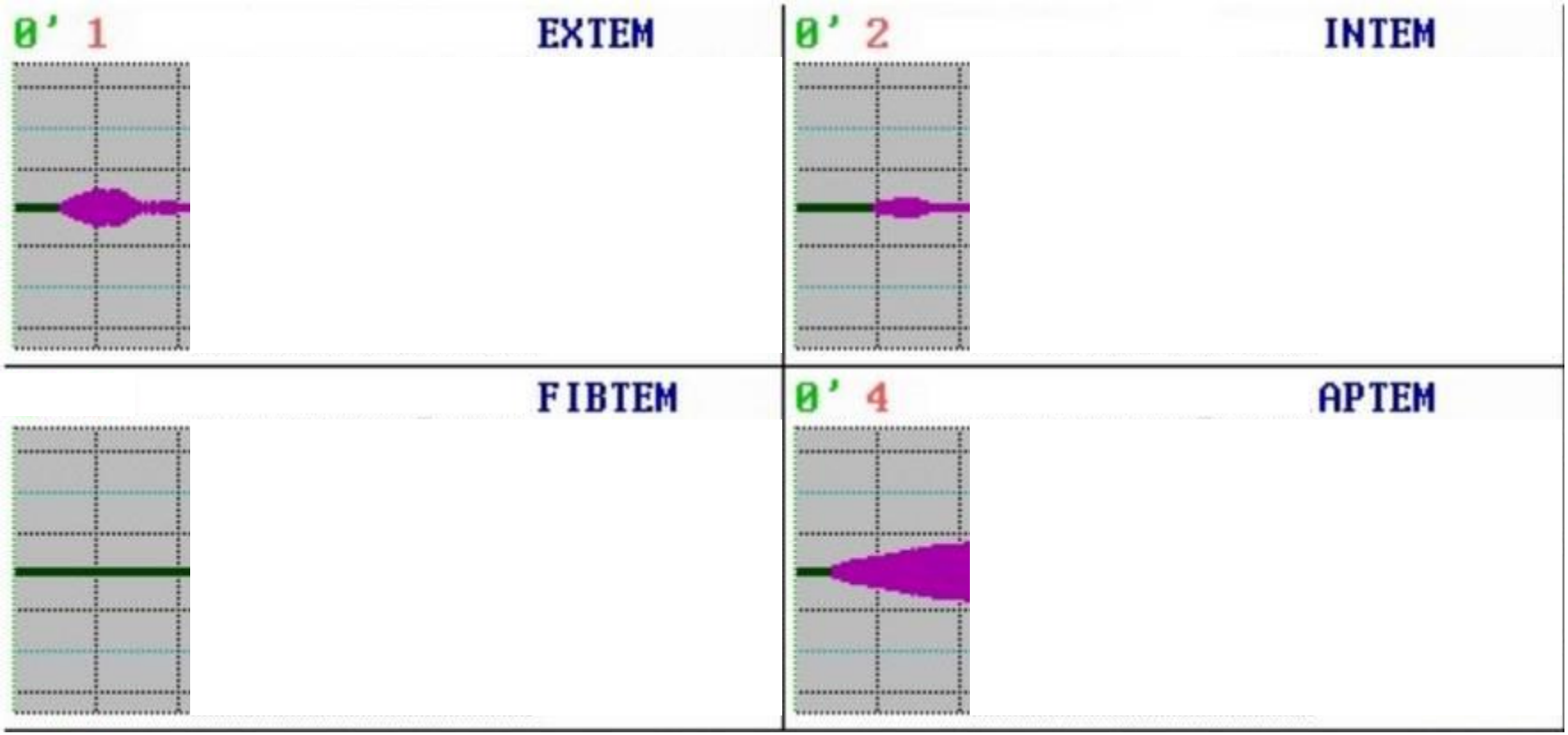
APTEM



Case 3 – severe postoperative bleeding

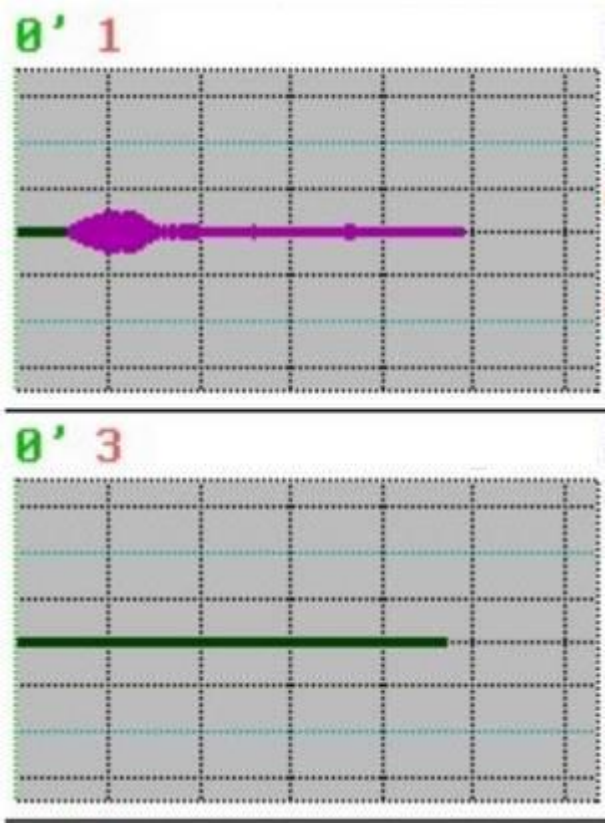


after 10 min



after 20 min

Diffuse bleeding: What is your next step?



11% **1. Administration of TXA**

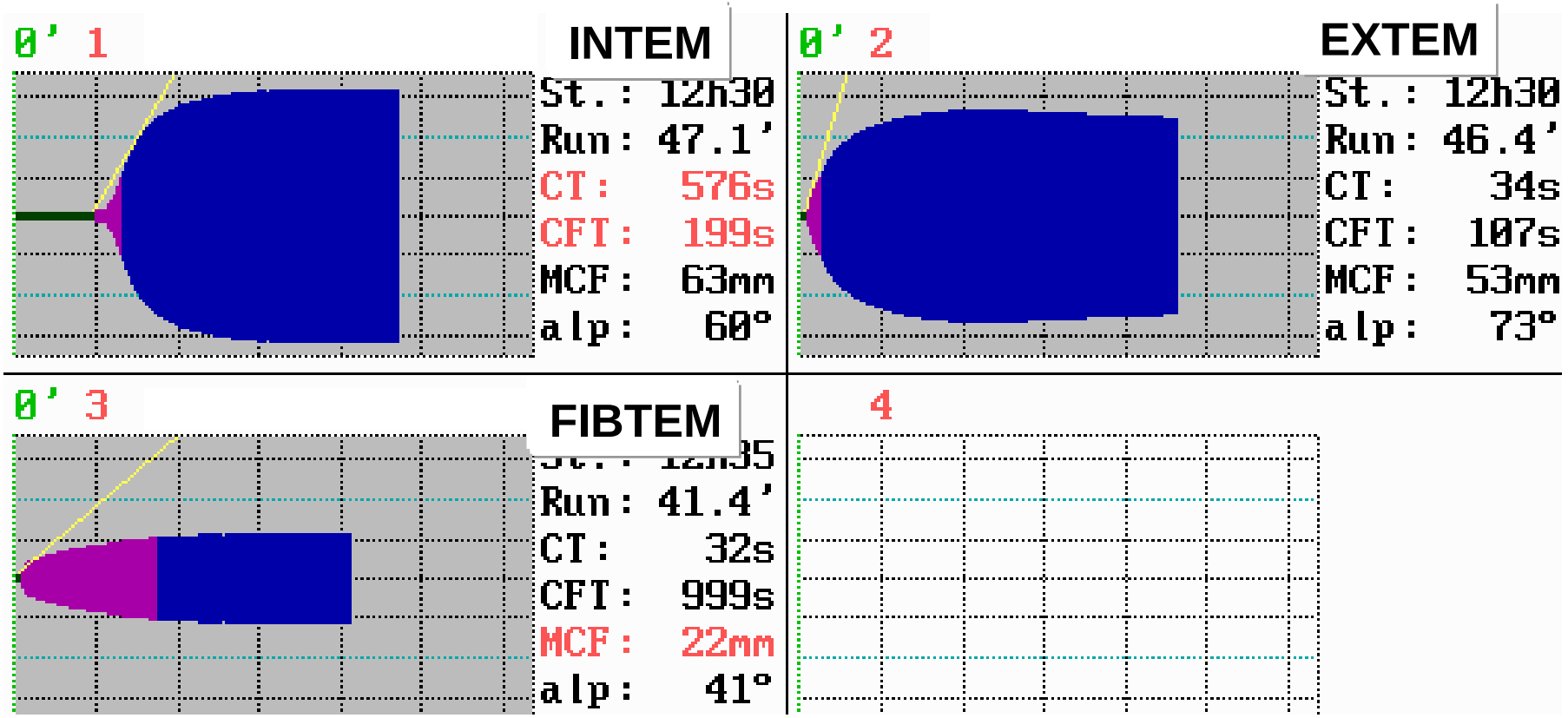
26% **2. Transfusion of FFP**

42% **3. Transfusion of cryo**

4% **4. Administration of protamin**

17% **5. Transfusion of platelets**

Case 4 – no heparin has been given



Diffuse bleeding: What is your next step?

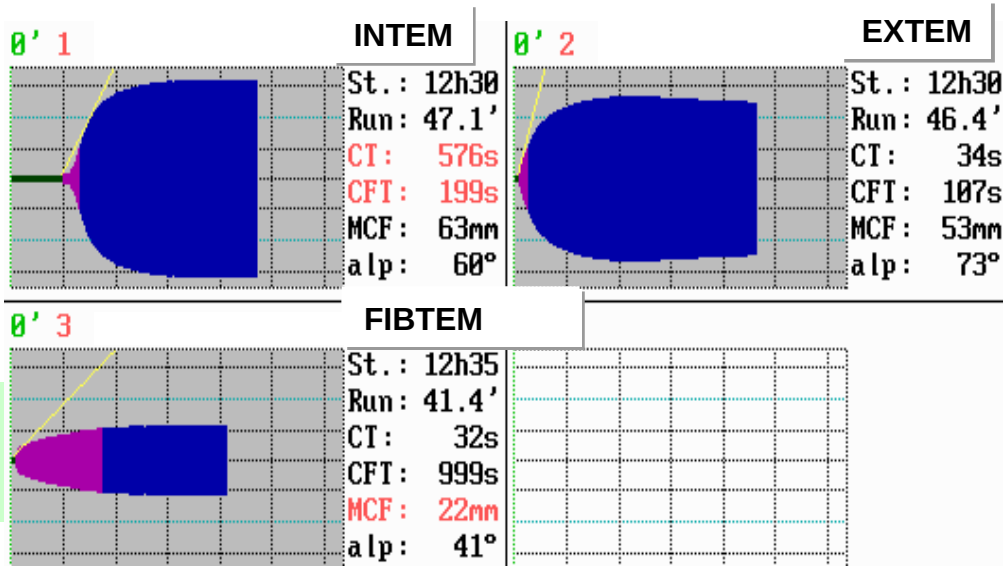
11% **1. TXA**

11% **2. Protamin**

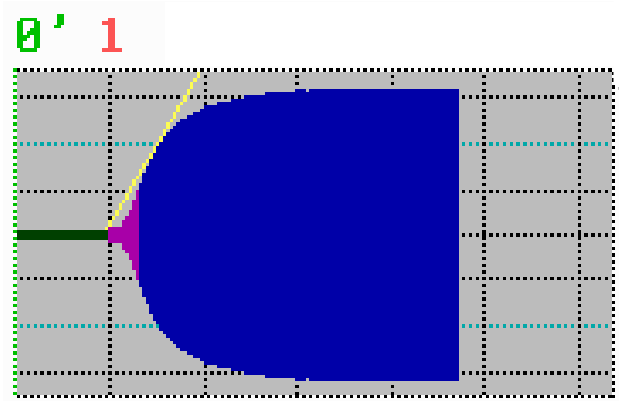
29% **3. PCC**

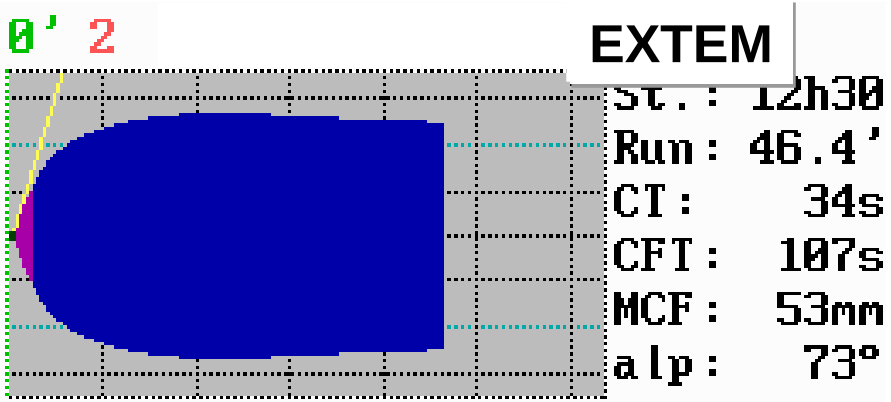
37% **4. FVIII**

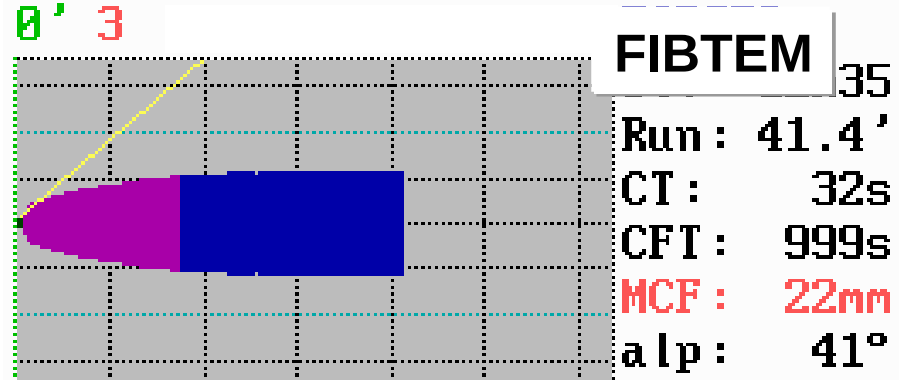
12% **5. FXIII**



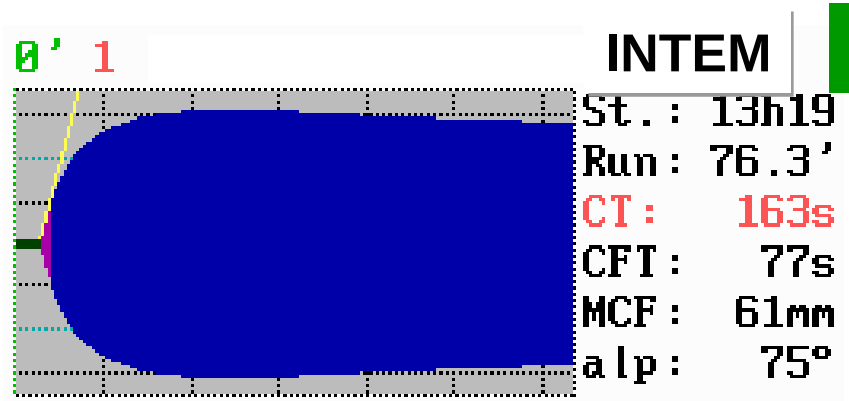
Confirmatory ROTEM-modified test



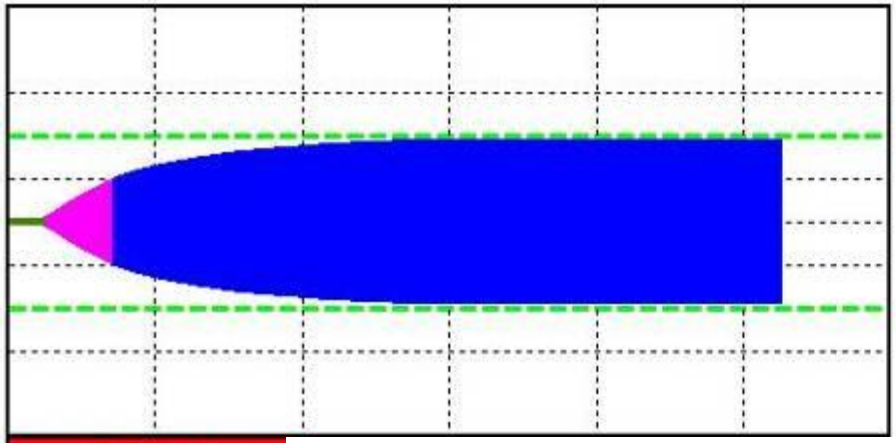




Hemophilia A (FVIII 3%)

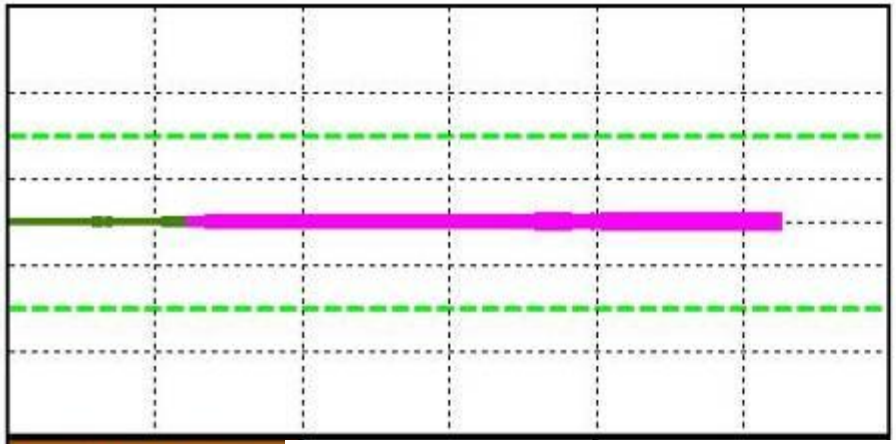


with FVIII addition



EXTEM

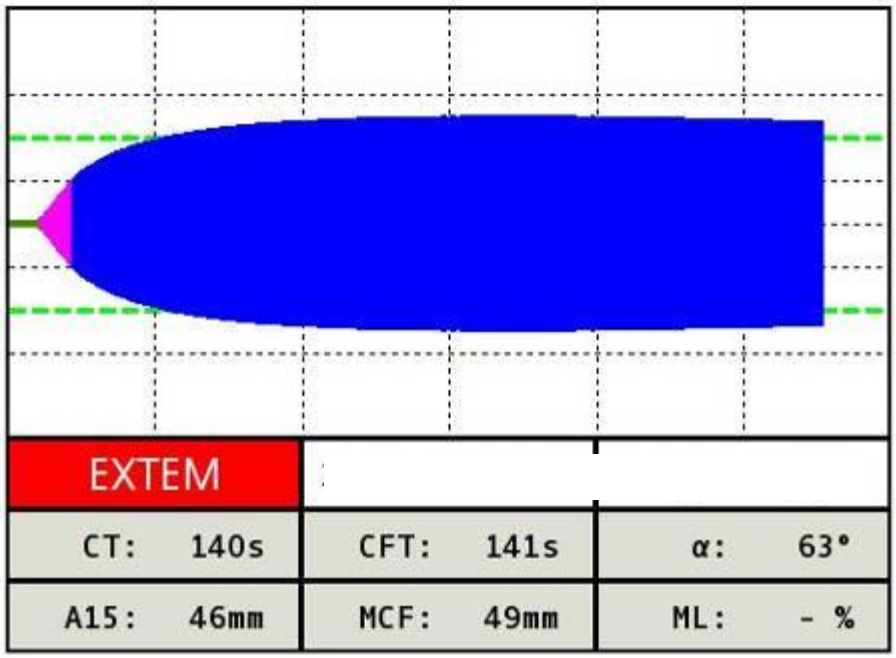
CT: 166s	CFT: 297s	α: 44°
A15: 33mm	MCF: 38mm	ML: - %

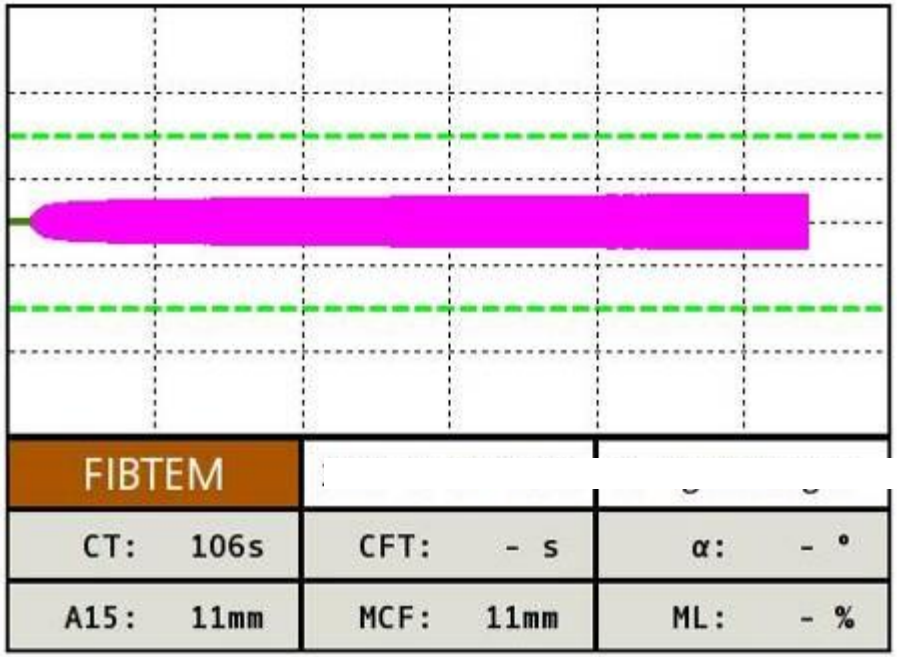


FIBTEM

CT: 776s	CFT: - s	α: - °
A15: 3mm	MCF: 3mm	ML: - %

Case 5 – severe bleeding during scoliosis repair





Which intervention has been done?

0%	1.	**TXA**
100%	2.	**Protamin**
0%	3.	**PCC**
0%	4.	**FVIII C**
0%	5.	**FI C**

According to the ESA guidelines on severe perioperative bleeding management fibrinogen concentrate should be considered …

63% 1. if fibrinogen concentration is < 1.5-2 g/L (GRADE 1C)

22% 2. if there are signs of hypofibrinolysis in ROTEM or TEG

5% 3. if high fibrinogen function is suspected or proven

10% 4. if platelet aggregation is decreased

Which is the recommended haemoglobin target in active severe perioperative bleeding according to the ESA guidelines?

18% 1. 10-12 g/dl

5% 2. >13 g/dl

2% 3. 5 g/dl

75% 4. 7-9 g/dl

e-tools for daily clinical practice: „applications“ for smartphone

- TIC app
- P P H app
- Dabigatran app
- Hip fracture app
- ABC guideline app
- ESA guideline webapp
- RA & anticoagulants app

TICapp

By OEGARI

Open iTunes to buy and download apps.

View More By This Developer

View In iTunes

Free

Category: Medical
Released: Feb 17, 2014
Version: 1.0
Size: 2.6 MB
Languages: English, German
Seller: Oesterreichische Gesellschaft für Anaesthesiologie, Reanimation und Intensivmedizin

Rated 4+

Compatibility: Requires iOS 6.0 or later. Compatible with

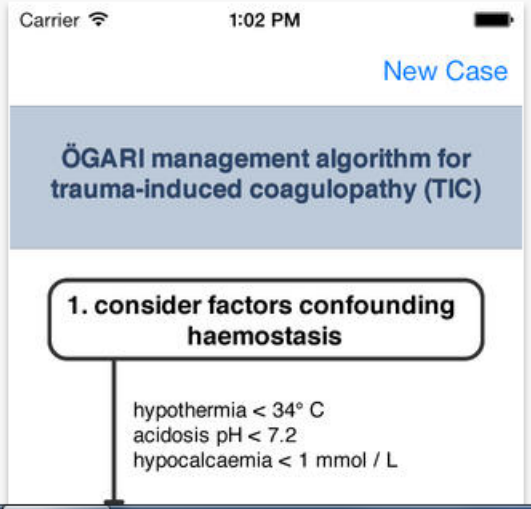
Description

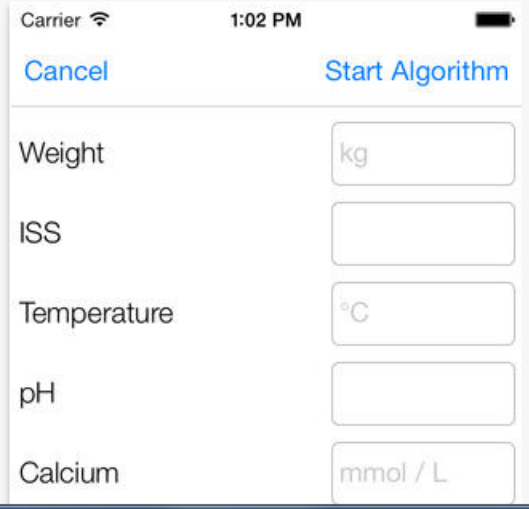
TICapp offers the following applications:

a) scroll down the algorithm of pathophysiology–oriented TIC management

TICapp Support ...More

iPhone Screenshots





https://itunes.apple.com/gb/app/abc-trauma/id721125718?mt=8

ABC-Trauma on the Ap...

ertieren Auswählen

Seite Sicherheit Extras

iTunes Preview

Overview Features

ABC–Trauma

View More by This Developer

By Cranworth Medical Ltd

Open iTunes to buy and download apps.

View In iTunes

This app is designed for both iPhone and iPad

Free

Category: Medical
Released: 17 November 2013
Version: 1.1
Size: 4.3 MB
Language: English
Developer: Cranworth Medical Ltd
© Cranworth Medical Ltd
Rated 12+ for the following:
Infrequent/Mild Alcohol, Tobacco, or Drug Use or References

Description

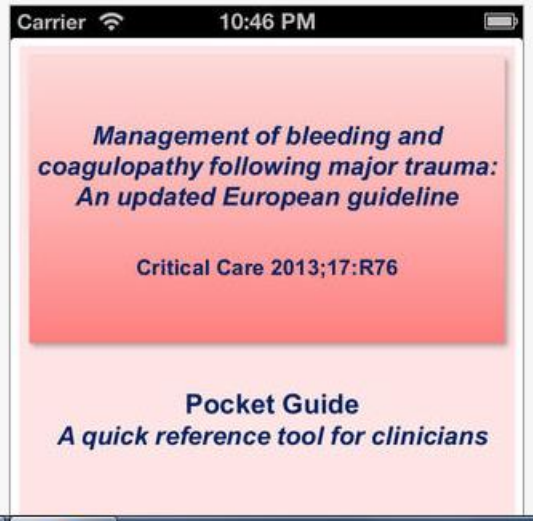
Summary of the 2013 European trauma guidelines: A quick reference tool for clinicians

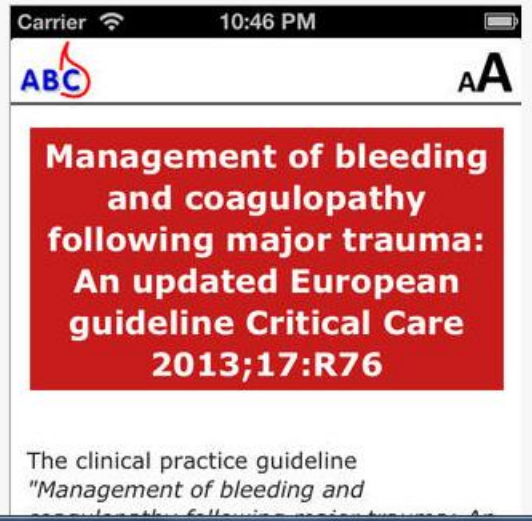
This clinical practice guideline provides evidence–based recommendations that aim to support the acute

ABC–Trauma Support ...More

Screenshots

iPhone | iPad





es.apple.com/at/app/pph-app/id846143956?mt=8

Freewave

„PPH App“ für iPhone, i...

Auswählen

Seite ▾ Sicherheit ▾ Extras ▾

Store | Mac | iPod | iPhone | iPad | iTunes | Support

iTunes Preview

Überblick Features

PPH App

von OEGARI

Mehr von diesem Entwickler

Öffnen Sie iTunes, um Apps zu kaufen und zu laden.

In iTunes ansehen

Gratis

Kategorie: Medizin
Erschienen: 30.03.2014
Version: 1.0
Größe: 1.0 MB
Sprachen: Deutsch, Englisch
Entwickler: Oesterreichische Gesellschaft f€r Anaesthesiologie, Reanimation und Intensivmedizin
© ÖGARI
Freigabe 12+ für Folgendes:
Selten/schwach ausgeprägt: Gebrauch von Alkohol, Tabak oder Drogen bzw. Verweise hierzu

Kompatibilität: Erfordert iOS 6.0 oder neuer. Kompatibel mit iPhone, iPad und iPod touch. Diese App ist für iPhone 5 optimiert.

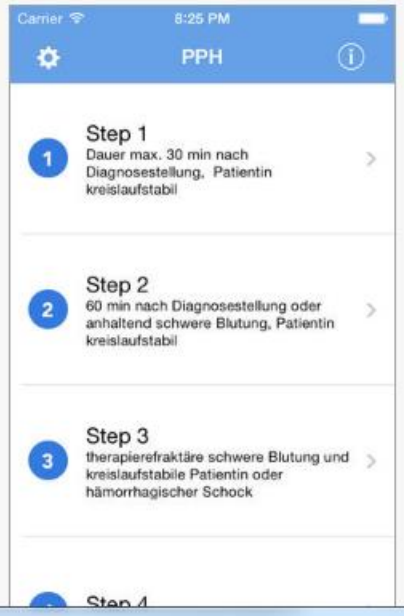
Kundenbewertungen

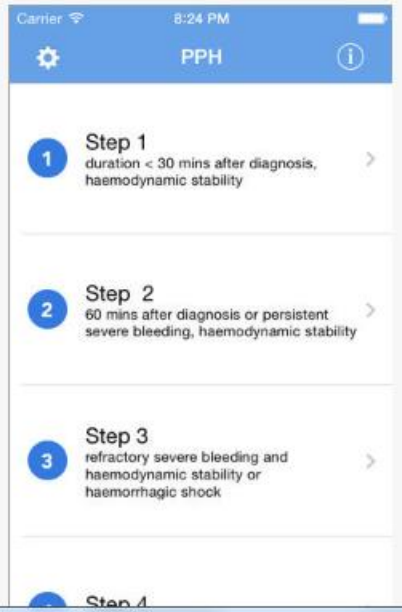
Beschreibung

OEGARI APP:
Die PPH App ist ausschließlich für Gesundheitsdiensteanbieter gemacht, die Gebärende betreuen.
Die PPH App soll den Usern im Sinne einer Crisis Checklist helfen eine peri-partale Blutung zu managen.

PPH App Support ▸

iPhone Screenshots





Dabigatran

von OEGARI

Öffnen Sie iTunes, um Apps zu kaufen und zu laden.

Beschreibung

Die Dabigatran App ist ausschließlich für Ärztinnen und Ärzte gemacht, die Patientinnen und Patienten mit einer Gerinnungshemmung durch das Medikament Pradaxa (RM) vor, während und nach Operationen bzw. bei Blutungsnotfällen behandeln.

Dabigatran Support ›

iPhone Screenshots

Kundenbewertungen

Wir haben noch nicht genügend Bewertungen erhalten, um einen Durchschnittswert für die aktuelle Version dieses Artikels

Eur J Anaesthesiol 2013; 30: 270-382

GUIDELINES

Management of severe perioperative bleeding

Guidelines from the European Society of Anaesthesiology

Sibylle A. Kozek-Langenecker, Arash Afshari, Pierre Albaladejo, Cesar Aldecoa Alvarez Santullano, Edoardo De Robertis, Daniela C. Filipescu, Dietmar Fries, Klaus Görlinger, Thorsten Haas, Georgina Imberger, Matthias Jacob, Marcus Lancé, Juan Llau, Sue Mallett, Jens Meier, Niels Rahe-Meyer, Charles Marc Samama, Andrew Smith, Cristina Solomon, Philippe Van der Linden, Anne Juul Wikkelsø, Patrick Wouters and Piet Wyffels

The aims of severe perioperative bleeding management are three-fold. First, preoperative identification by anamesis and laboratory testing of those patients for whom the perioperative bleeding risk may be increased. Second, implementation of strategies for correcting preoperative an... and stabilisation of the macro- and microcirc... to optimise the patient's tole... targeted procoagulant ... of bleeding ... ...pose of the ... ...of current knowledge into daily patient care wherever possible. The Guidelines Committee of the European Society of Anaesthesiology (ESA) formed a task force with members of scientific subcommittees and individual expert members of the ESA. Electronic databases were searched without language restrictions from the year 2000 until 2012. These searches produced 20 664 abstracts. Relevant systematic reviews with meta... trolled trials, cohort... cross-sectio... ...ggestion ...tish Intercollegiate ...ading system was initially used ... of evidence and to grade recommen... ...during the process of guideline development, the official position of the ESA changed to favour the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system. This report includes general recommendations as well as specific recommendations in various fields of surgical interventions. The final draft guideline was posted on the ESA website for four weeks and the link was sent to all ESA members. Comments were collated and the guidelines amended as appropriate. When the final draft was complete, the Guidelines Committee and ESA Board ratified the guidelines.

Cardiovascular surgery

Withdrawal of aspirin therapy increases the risk of thrombosis; continuation of aspirin therapy increases the risk of bleeding. **A**

Withdrawal of clopidogrel therapy increases the risk of thrombosis; continuation of clopidogrel therapy increases the risk of bleeding. **A**

We recommend that a prophylactic dose of low molecular weight heparin should be administered subcutaneously 8–12 h before elective CABG surgery. This intervention does not increase the risk of perioperative bleeding. **1B**

We recommend that tranexamic acid or EACA should be considered before CABG surgery. **1A**

Wesuggest considering prophylactic preoperative infusion of 2 g fibrinogen concentrate in patients with fibrinogen concentration < 3.8 g l^{-1}, because it may reduce bleeding following elective CABG surgery. **2C**

Prothrombin complex concentrate is effective for rapid reversal of oral anticoagulation before cardiac surgery. **A**

We recommend that intraoperative tranexamic acid or EACA administration should be considered to reduce perioperative bleeding in high-, medium- and low-risk cardiovascular surgery. **1A**

We recommend that tranexamic acid should be applied topically to the chest cavity to reduce postoperative blood loss following CABG surgery. **1C**

We recommend that fibrinogen concentrate infusion guided by point-of-care viscoelastic coagulation monitoring should be used to reduce perioperative blood loss in complex cardiovascular surgery. **1B**

6: Alternatives and adjuncts to blood transfusion

Essentials

- Transfusion alternatives were mostly developed to reduce blood use in surgery but have much wider application.
- They are most effective when used in combination and as part of a comprehensive patient blood management programme.
- Predeposit autologous blood donation before surgery is of uncertain benefit and now has very restricted indications in the UK.
- Intraoperative cell salvage (ICS) is effective (and may be life-saving) in elective or emergency high blood loss surgery and management of major haemorrhage.
- Postoperative cell salvage (PCS) and reinfusion can reduce blood use in joint replacement and scoliosis surgery.
- ICS and PCS are usually acceptable to Jehovah's Witnesses.
- Tranexamic acid (antifibrinolytic) is inexpensive, safe and reduces mortality in traumatic haemorrhage. It reduces bleeding and transfusion in many surgical procedures and may be effective in obstetric and gastrointestinal haemorrhage.
- Off-label use of recombinant activated Factor VII (rFVIIa) for haemorrhage does not reduce mortality and can cause serious thromboembolic complications.
- Erythropoiesis stimulating agents (ESAs), such as erythropoietin, are standard therapy in renal anaemia and can support blood conservation in some cancer chemotherapy patients and autologous blood donation programmes. They may also be effective in selected patients with myelodysplasia.
- ESAs may cause hypertension and thromboembolic problems. Careful monitoring is required to keep the haematocrit below 35%.

„Translate" guidelines into your clinical reality

Checklist for the emergency management of severe or massive intraoperative bleeding at the Evangelical Hospital Vienna, Austria

1. Avoid hypothermia < 34°C, pH < 7.2, hypocalcemia < 1 mmol/L.

2. Careful surgical technique, permissive hypotension, increase tolerance to anemia.

3. Risk for (local) hyperfibrinolysis (e.g., orthopedic surgery with tourniquet, severe trauma, shock): prophylaxis with tranexamic acid 10–20 mg/kg.

4. In case of overt severe bleeding (> 20% blood volume):
   a. If hyperfibrinolysis (according to ROTEM or reptilase time): tranexamic acid 15–20 mg/kg (before any procoagulant therapy).
   b. If fibrin deficit (FIBTEM A10 < 10 mm, fibrinogen concentration < 1.5 g/L): fibrinogen concentrate (dose calculation: approximately A10 increment x 0.55 or fibrinogen level increment x 4) (alternative: FFP > 30 mL/kg).
   c. If thrombin generation deficit (> 250% blood volume loss; EXTEM CT > 80s or indicative routine coagulation tests): prothrombin complex concentrate 20 U/kg (alternative: FFP > 30 mL/kg).
   d. If platelet deficit (according to ROTEM or platelet counts < 50 G/L): platelet concentrate.

5. Only as an ultimate measure after surgical and pharmacological interventions have failed and only after "preconditioning" with supplementation of substrates (fibrinogen, platelets) at pH > 7.2: recombinant factor VIIa (off-label use).

6. In case of overt severe bleeding in the presence of a normal ROTEM and/or history of antiplatelet drugs (± indicative platelet function tests): desmopressin 0.3 µg/kg, if non-responsive to platelet concentrates.

7. In case of overt severe bleeding and history of vitamin K antagonists: reversal with prothrombin complex concentrate (dose calculation; 25–50 U/kg adjusted to actual INR).

8. In case of overt severe bleeding and history of direct oral antagonists: consider last intake, renal function, active charcoal, hemo(dia)filtration, reversal with prothrombin complex concentrate.

9. After heparin: consider reversal with protamine.

10. If factor XIII deficit (or indicative ROTEM): consider factor XIII concentrate.

Conclusions

severe POB > 20 % loss in blood volume

therapy is a concert of targeted actions

… heparin effect, hyperfibrinolysis, factor VIII deficiency, fibrinogen deficiency …

… pathophysiology-oriented, fast, cost-effective …

ESA guidelines exist EJA 2013; 30: 270