obstetriska blödningar viscoelastiska metoder och fall

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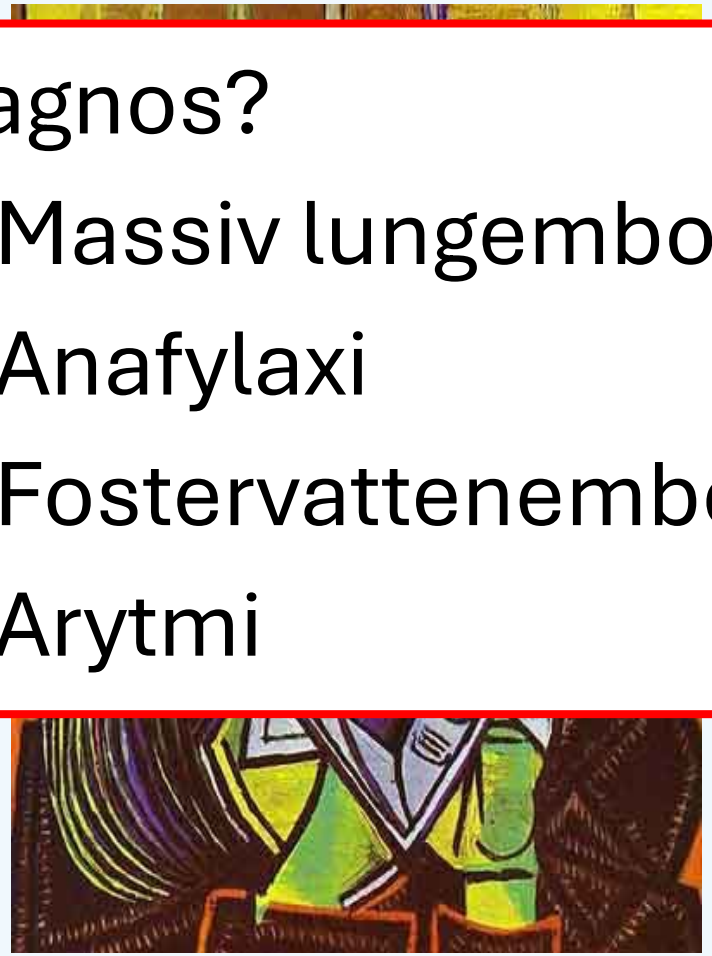
30-årig kvinna

- Frisk, BMI 29
- II-gravida, I-para
- 2019 grad IV ruptur
- Gravid vecka 38+3
- Plan: elektivt snitt

- Spinal ok
- Fenylefrin pga blodtrycksfall
- Barn och placenta tas enkelt ut
- Plötsligt händer:
  - Patient känner sig konstig och får illamående
  - Blod tryck ua
  - Plötsligt, medvetslös och kramper

Planerat kejsarsnitt

Medvetslös och kramper



Diagnos?

1. Massiv lungemboli
2. Anafylaxi
3. Fostervattenemboli
4. Arytmi

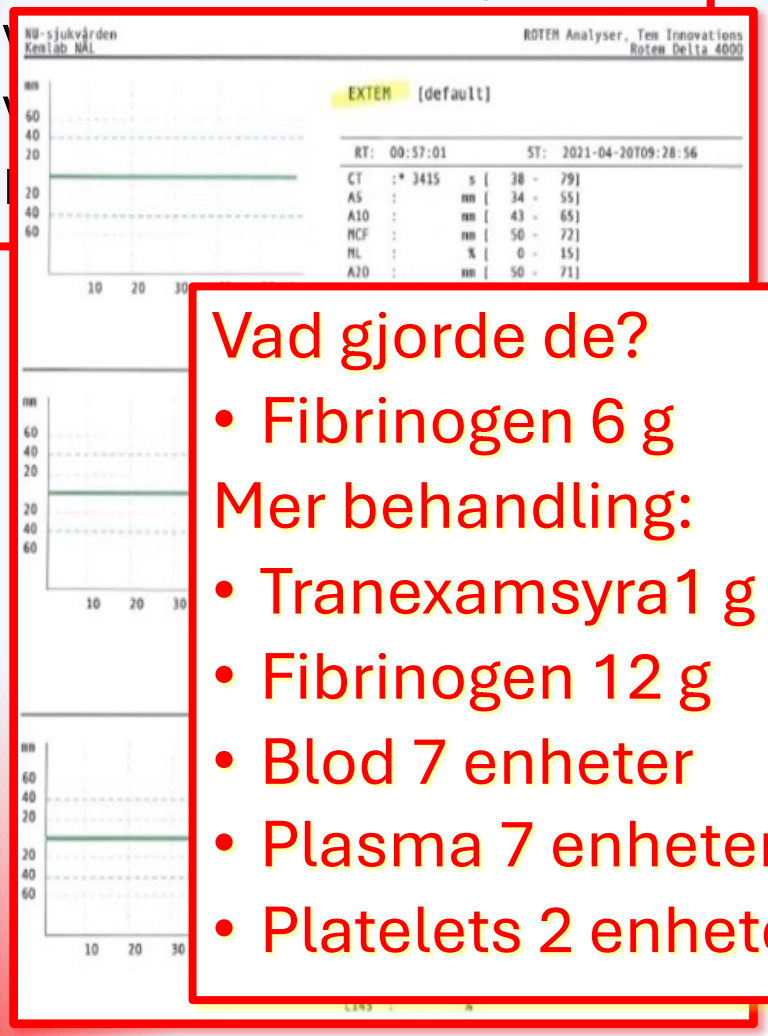
- Tillkallar hjälp
- Intuberar
- Ventilation ok
- Bradykardi
- Ingen CO_2 utbyte
- Oooh no, asystoli

1. HLR och adrenalin
2. ROSC inom 2 minuter
3. Artärnål, blodgas
4. UCG
5. ROTEM

30-årig kvinna

Maternell kollaps, diagnos?

- Obstetriker avsluta operation
-
-
-



Vad gjorde de?

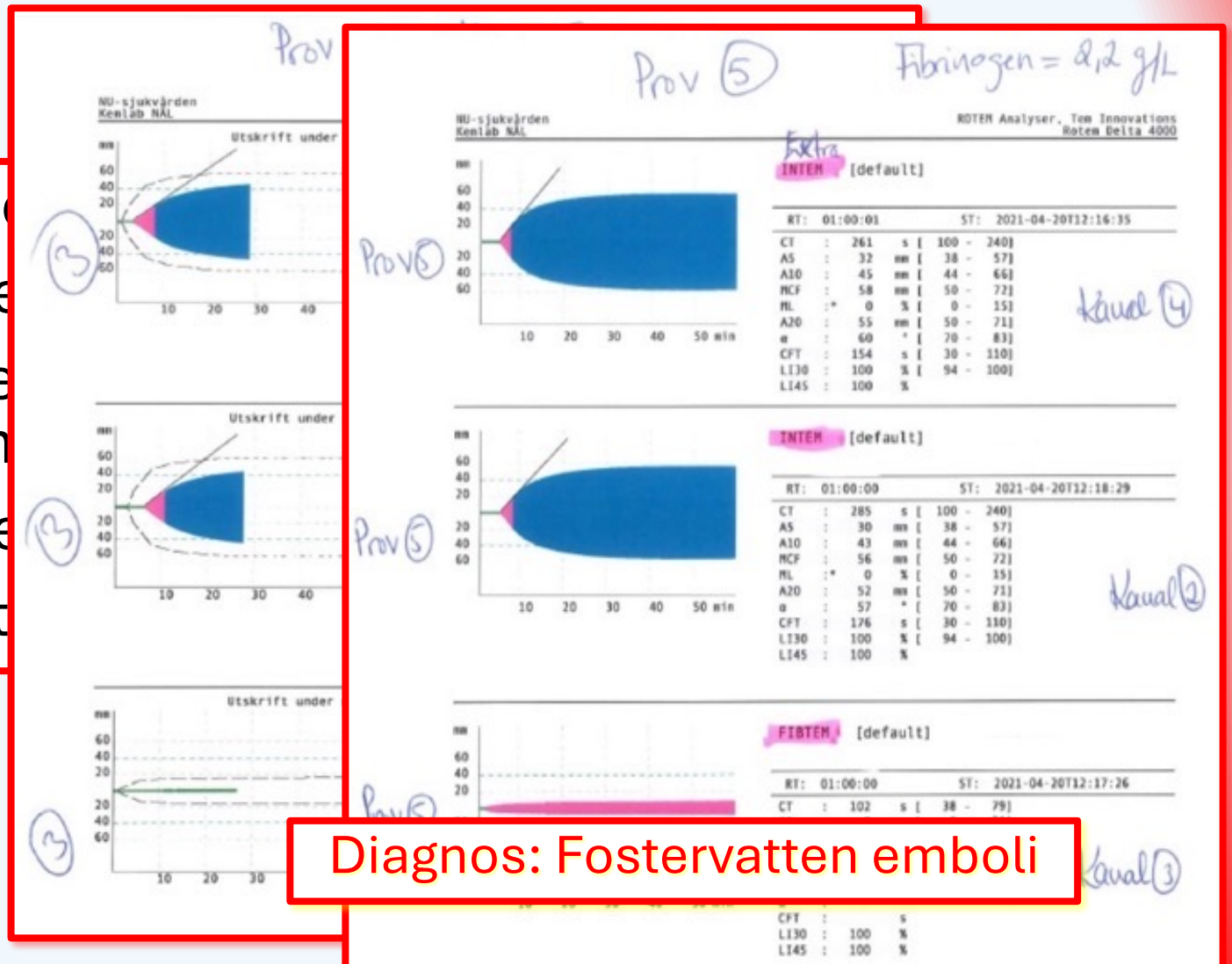
- Fibrinogen 6 g

Mer behandling:

- Tranexamsyra1 g
- Fibrinogen 12 g
- Blod 7 enheter
- Plasma 7 enheter
- Platelets 2 enheter

Vad g

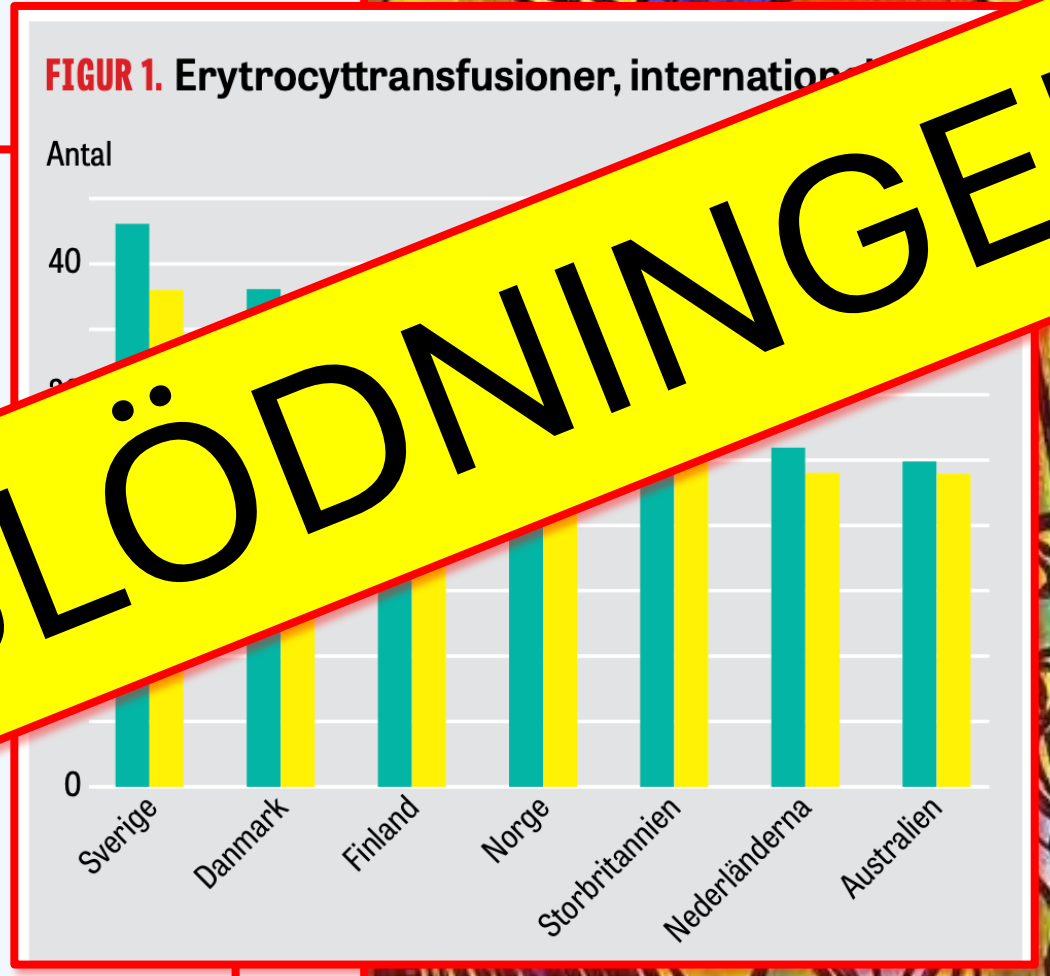
1. Ge
2. Be an
3. Ge
4. Ut



Diagnos: Fostervatten emboli

Stora blödningar

- Ökad mortalitet
- Ökad morbiditet
- Transfusionskomplikationer:
  - Infektioner
    - Virus
    - Bakteriell ko
    - Okän
  - In
    - usions reaktion
    - I, transfusion related acute lung injury
- Stora kostnader



STOPPA BLÖDNINGEN

Akut postpartu

ÖVERVÄG ALLTID AORTAKOMPRESSION

Steg 1
Blödning >500 ml

- Tillkalla extra BM+USK samt läkare
- Försök lösa placenta med traktion av navelsträng
- Blödningsvagn+protokoll
- PVK+bastest
- Oxytocin totalt 16,6 µg im/iv (max 16,6µg)
- Tappa urinblåsan
- Identifiera orsak och påbörja åtgärder
  - ✓ Atoni, placenta, bristning eller koagulation?

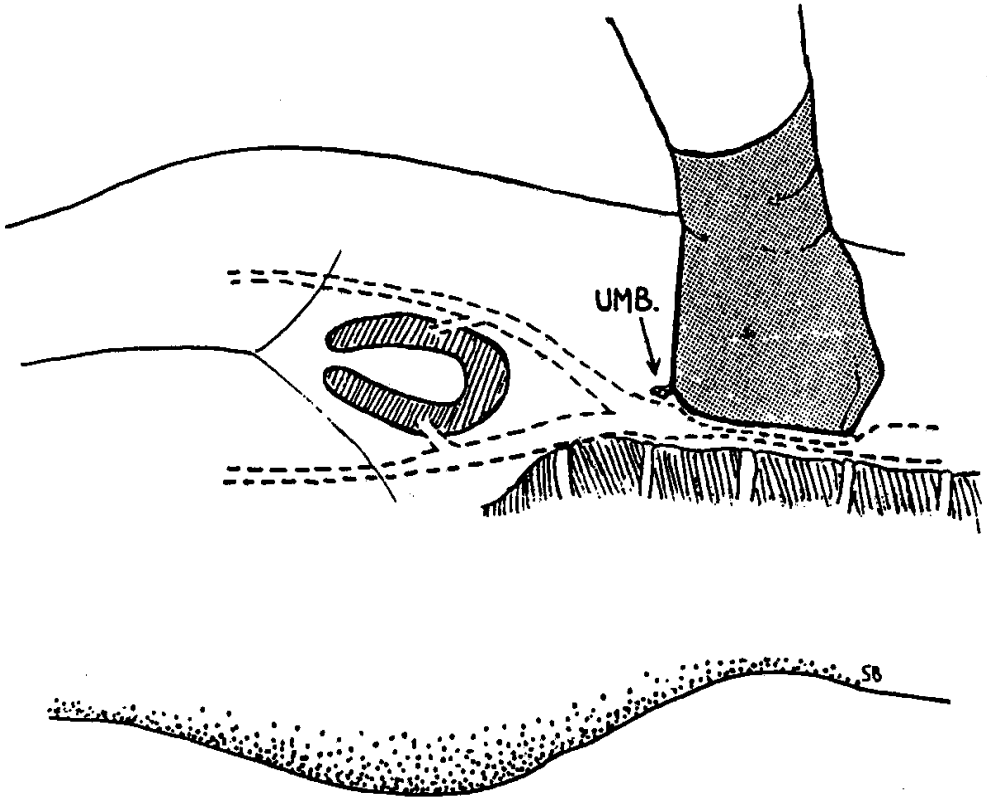
Steg 2
Fortsatt blödning

Säkerställ att åtgärder på steg 1 är utförda

- Lös placenta
- Metylergometrin 0,2 mg iv/im
- Förstärkt oxytocindropp
- Extra PVK
- Tranexamsyra 1 g iv
- Prostinfenem 0,25 mg im
- Misoprostol 0,2mg 3 tabl subl

Ste
Blö
(eller

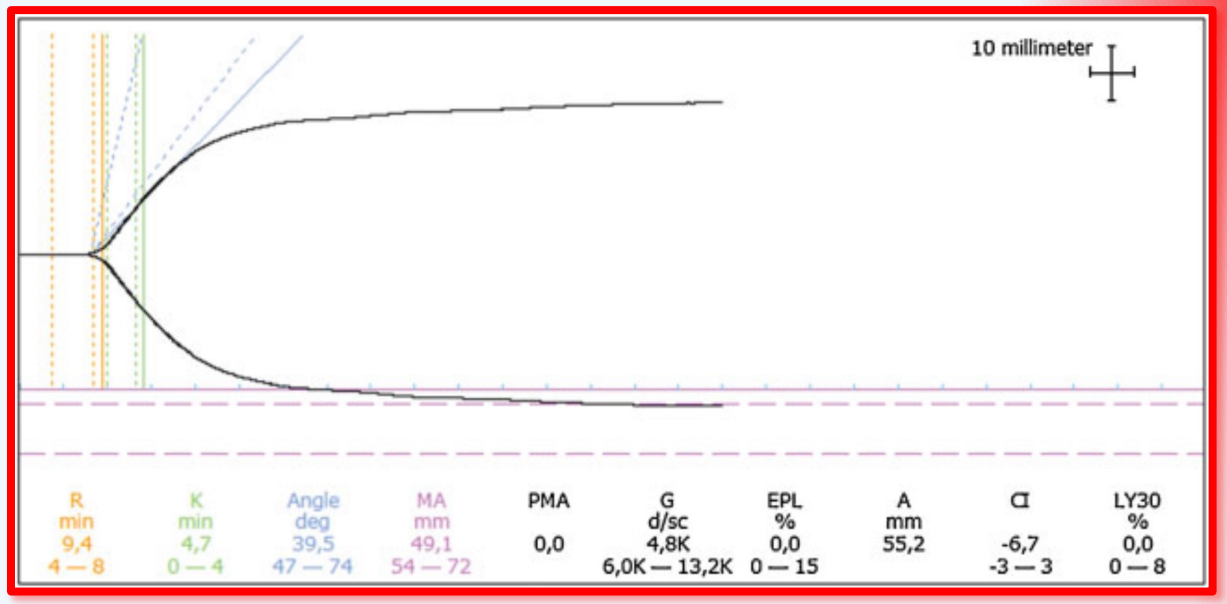
Säk
på s
- Ko
- Sy
- Pla
- Kr
  1 l
- Tra
- KA

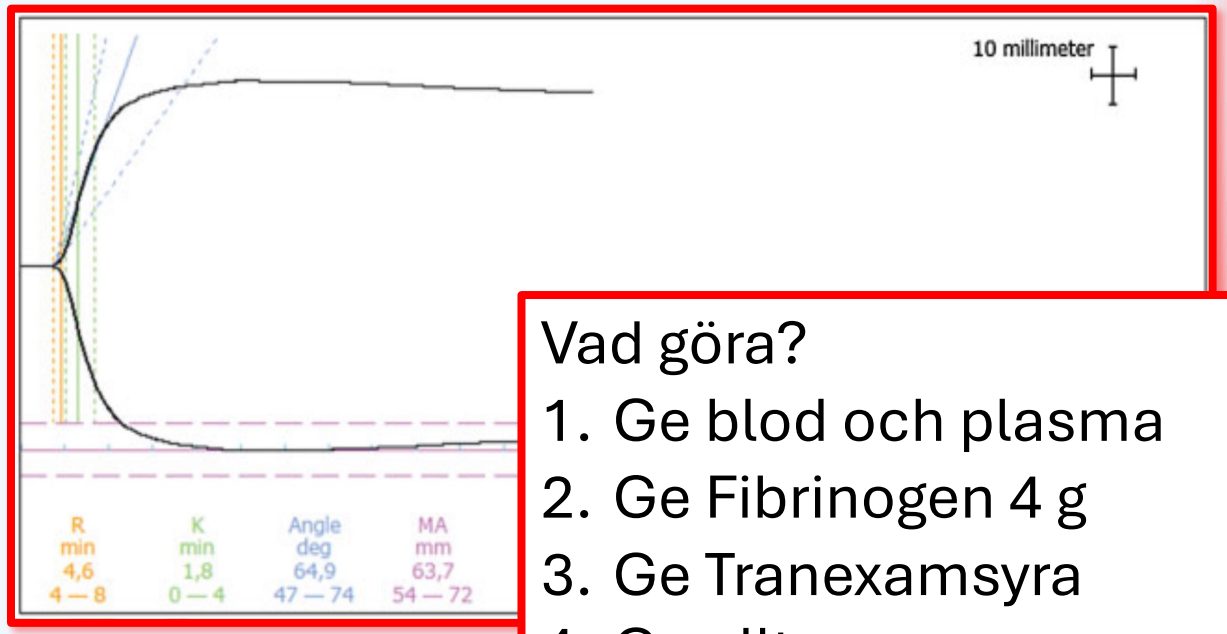


FIGUR 39 - Aortakompression sker lättast i höjd med naveln, som på bukens yta motsvarar projektionen av nedersta delen av bukaorta innan bifurkationen. Ena handen palperar först ljumskens puls. Den knutna andra handen, mjukt och försiktigt anlagd mot naveln, sänks sakta tills aortapulsationerna förnimmes. Ytterligare kompression leder till flödesminskning och -stopp i aorta genom att handen pressar ihop aorta mot kotpelarens framvägg.

Kvinna, 37 år

- Frisk
- Susp Ablatio
- Omedelbart snitt
- Tranexamsyra
- Oxytocin, metylergometrin misoprostol karboprost
- Blödning 1500 ml
- Blodprover (ingen TEG)
  - Felaktigt fyllda





- Blod och plasma
- Fibrinogen 4 g
- Tranexamsyra 2 g
- Reoperation
  - TEG
  - Ingen pågående blödning
  - Gammalt 1500 ml

- UVA, stabil ➢
- BB avd. Hb 88 g/l
- BB mår inte bra
- Nya blodprover

- Hb 70-77
- TPK 123
- APTT PT(INR) normal
- Fibrinogen <0,6 g/l

Reflektioner
- Hemostarubbning
- Ablatio
- TEG/Rotem, första op!
- Rätt från början ★

Vad göra?
1. Ge blod och plasma
2. Ge Fibrinogen 4 g
3. Ge Tranexamsyra
4. Ge allt

Tranexamsyra

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Tranexamic Acid for the Prevention of Blood Loss after Cesarean Delivery

L. Sentilhes, M.V. Sénat, M. Le Lous, N. Winer, P. Rozenberg, G. Kayem, E. Verspyck, F. Fuchs, E. Azria, D. Gallot, D. Korb, R. Desbrière, C. Le Ray, C. Chauleur, F. de Marcillac, F. Perrotin, O. Parant, L.J. Salomon, E. Gauchotte, F. Bretelle, N. Sananès, C. Bohec, N. Mottet, G. Legendre, V. Letouzey, B. Haddad, D. Vardon, H. Madar, A. Mattuizzi, V. Daniel, S. Regueme, C. Roussillon, A. Benard, A. Georget, A. Darsonval, and C. Deneux-Tharaux, for the Groupe de Recherche en Obstétrique et Gynécologie*

ABSTRACT

BACKGROUND

Prophylactic administration of tranexamic acid has been associated with reduced postpartum blood loss after cesarean delivery in several small trials, but evidence

- Randomiserad 4400 patienter
- Inj Tranexamsyra 1 g alt inj NaCl
- Kalkylerad blödning 550 / 650 ml
- Ingen skillnad uppmätt blödnings mängd, transfusioner, bruk av uterotonika, embolisering mm

Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial

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Lancet 2017; 389: 2105–16
Published Online
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This online publication has been corrected. The corrected version first appeared at thelancet.com on May 5, 2017
See Editorial page 2081

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- 20.000 patienter, 21 länder, 193 sjukhus
- Randomiserad, dubbel-blind, placebo kontrollerad
- Inj Tranexamsyra 1g, en andra dos möjlig
- Minskad mortalitet pga minskad blödning

EJA

Eur J Anaesthesiol 2023; **40**:226–304

GUIDELINES

Management of severe peri-operative bleeding: Guidelines from the European Society of Anaesthesiology and Intensive Care

Second update 2022

Sibylle Kietaibl, Aamer Ahmed, Arash Afshari, Pierre Albaladejo, Cesar Aldecoa, Giedrius Barauskas, Edoardo De Robertis, David Faraoni, Daniela C. Filipescu, Dietmar Fries, Anne Godier, Thorsten Haas, Matthias Jacob, Marcus D. Lancé, Juan V. Llau, Jens Meier, Zsolt Molnar, Lidia Mora, Niels Rahe-Meyer, Charles M. Samama, Ecaterina Scarlatescu, Christoph Schlimp, Anne J. Wikkelsø and Kai Zacharowski

BACKGROUND Management of peri-operative bleeding is complex and involves multiple assessment tools and strategies to ensure optimal patient care with the goal of reducing morbidity and mortality. These updated guidelines from the European Society of Anaesthesiology and Intensive Care (ESAIC) aim to provide an evidence-based set of recommendations for healthcare professionals to help ensure improved clinical management.

DESIGN A systematic literature search from 2015 to 2021 of several electronic databases was performed without language restrictions. Grading of Recommendations, Assessment, Development and Evaluation (GRADE) was used to assess the methodological quality of the included studies and to formulate recommendations. A Delphi methodology was used to prepare a clinical practice guideline.

RESULTS These searches identified 137 999 articles. All articles were assessed, and the existing 2017 guidelines were revised to incorporate new evidence. Sixteen recommendations derived from the systematic literature search, and four clinical guidances retained from previous ESAIC guidelines were formulated. Using the Delphi process on 253 sentences of guidance, strong consensus (>90% agreement) was achieved in 97% and consensus (75 to 90%

- Inj Tranexamsyra 1 g iv
- Så snart som möjligt, inom 3 timmar
- Kan upprepas
- Kan övervägas vid högrisk kejsarsnitt
- Ger illamående och kräkningar

Blodtransfusion

Bedöm om blödning kommer att:

Blödning < ½ blodvolym och blödning avstannar

- Transfundera
  - Så lite som möjligt
  - Målriktad terapi
  - Kristalloid

Blödning > ½ blodvolym och blödning pågår

- Transfundera
  - Blod/plasma/trombocyter
  - 4:4:1

BJA

British Journal of Anaesthesia 115 (1): 99–104 (2015)

doi: 10.1093/bja/aev039
Advance Access Publication Date 18 March 2015
Obstetrics

- Fibrinogen koncentration medel 5,3 g/l
- Intervall 2,9 – 8,8 g/l

OBSTETRICS

Fibrinogen plasma concentration before delivery is not associated with postpartum haemorrhage: a prospective observational study

O. Karlsson[1,*], A. Jeppsson[2,3], M. Thor
and M. Hellgren[7,8,9]

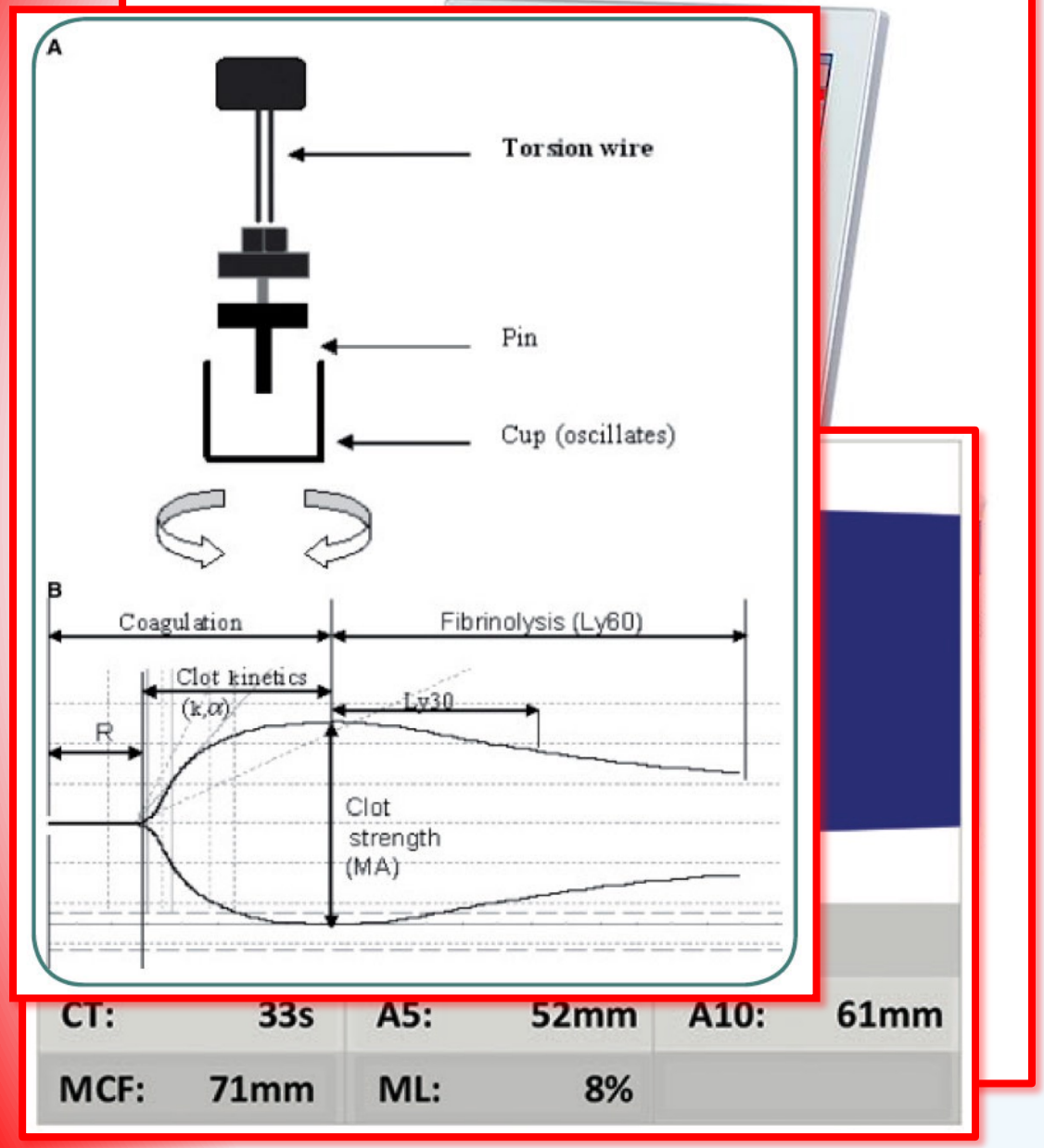
Abstract

Background: Low plasma fibrinogen concentration has been linked to postpartum haemorrhage. The primary aim of this study was to assess whether fibrinogen concentration at admission before labour is associated with severe postpartum haemorrhage. Secondary aims were to describe fibrinogen concentration before and after labour and to identify predictors for severe postpartum haemorrhage.

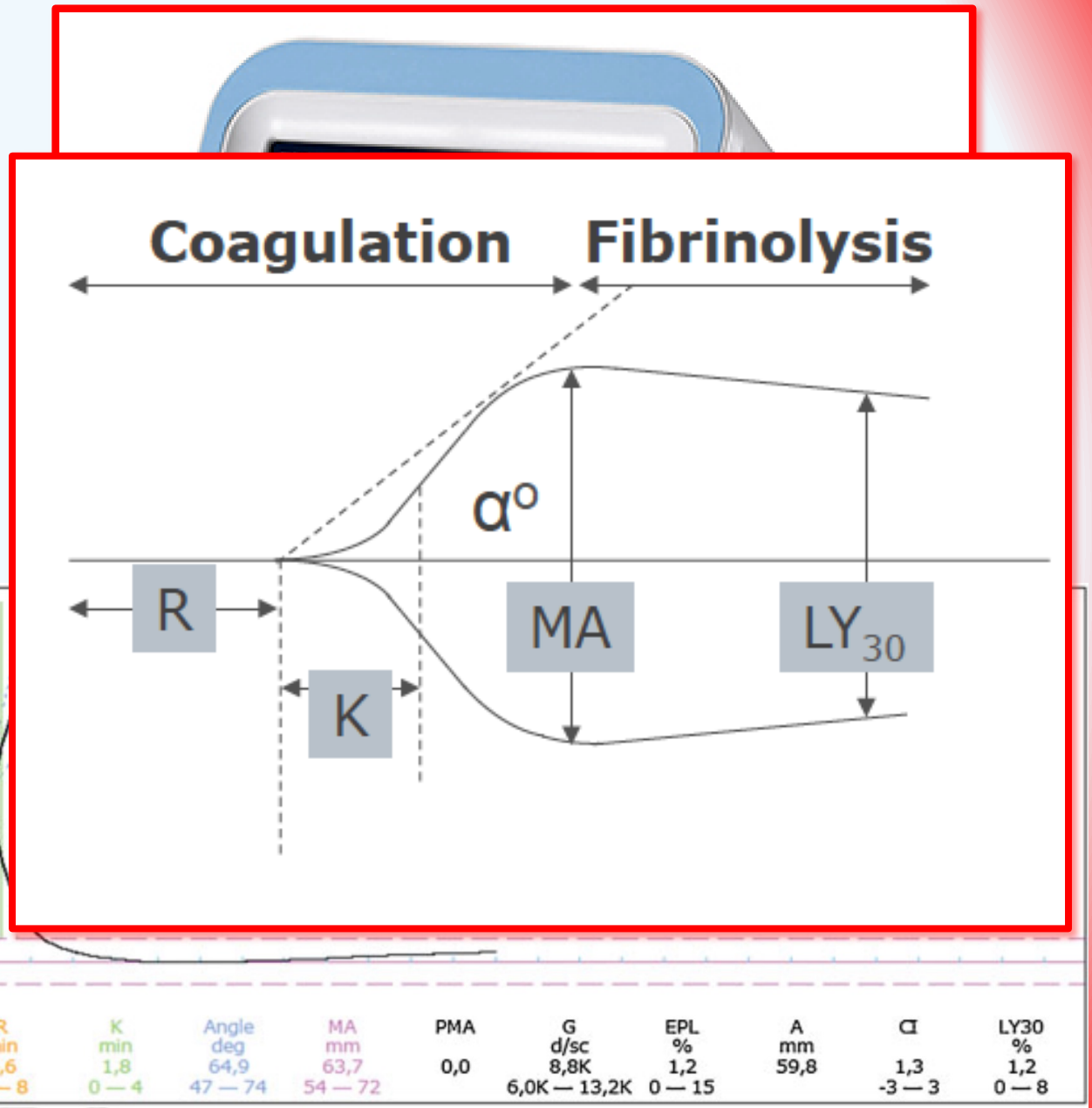
Methods: 1951 healthy women were included in a prospective observational study. Fibrinogen concentration was determined at admission to the labour ward and in a subgroup of women (n=80) also after the placenta was delivered. Bleeding volume postpartum was estimated by weighing surgical sponges and pads and by measuring collected blood. Predictors for severe postpartum haemorrhage (>1000 ml) were identified with bivariate and multivariate regression analyses.

Results: Mean fibrinogen concentration was 5.3 (SD 0.8) g litre^{-1}. Median estimated blood loss was 450 (range 70–4400) ml and 250 (12.8%) women bled >1000 ml. Fibrinogen concentration was not correlated with postpartum haemorrhage in the entire cohort (r_s=0.003, P=0.90) or in any subgroup. Fibrinogen concentration was not associated with bleeding >1000 ml (odds ratio 1.01 (CI 95% 0.85–1.19), P=0.93) and did not differ significantly before and after delivery. Oxytocin stimulation, instrumental delivery, Caesarean section and exploration of uterus were identified as independent predictors of haemorrhage >1000 ml.

Conclusions: Fibrinogen plasma concentration at admission before labour does not predict severe postpartum haemorrhage in a general obstetric population. Fibrinogen concentration does not decrease significantly during normal labour. Excessive postpartum bleeding is mainly as a result of obstetric complications.



CT:	33s	A5:	52mm	A10:	61mm
MCF:	71mm	ML:	8%		



EJA

GUIDELINES

Massiv transfusion trauma

Omedelbar åtgärd utan provsvar:

- Transfusion 4:4:1
- Fibrinogen (Riastap) 2-4 g
- Tranexamsyra (Cyklokapron) 2 g
- Reversera ev antikoagulantia (se baksida)

Målparametrar pågående blödning:

		Åtgärd
Hb	>90	E-konc
TPK	>100	Trombocyter
Fibrinogen	>2-2,5	Fibrinogen (Riastap) 2-4 g
Calcium	>1	Initialt Calcium-Sandoz 10 ml / 5 min
Temp	>36,5	Värmetäcke / blodvärmare
pH	>7,2	Optimera cirkulation
Syst. BT (Skallskada >100)	80-100	↑Transfusion ↓Anestesi

ROTEM (nytt prov efter åtgärd)
+ rutinanalyser (PK-INR, APTT, TPK, Hb, fibrinogen och blodgas)

Normala resultat → Kirurgisk åtgärd

Misstanke om heparineffekt

CT EXTEM > 80 sek. och/eller CT INTEM > 240 sek.	**A10** FIBTEM < 12 mm (< 9 mm vid hemostas)	**A10** EXTEM < 43 mm och **A10** FIBTEM ≥ 12 mm	ML EXTEM > 15%	CT INTEM > CT HEPTEM
PCC (EXTEM) och/eller FFP (EXTEM/INTEM)	Fibrinogen	Trombocyter	Tranexamsyra	Protamin

ROTEM kan inte detektera vissa trombocythämmare, von Willenbrand-brist eller blödning pga hypotermi. Målvärden och läkemedelsdoser gäller för transfusion enligt massivt transfusionsprotokoll vid trauma. Vid långdragen blödning och dålig hemostas trots ovanstående åtgärder – kontakta koagulationsjour. Ver 1.0

Mycket viktigt för fungerande hemostas:

Syra-bas

Calcium

Temperatur

Review Article

The Journal of TRAUMA® *Injury, Infection, and Critical Care*

Preconditions of Hemostasis in Trauma: A Re… The Influence of Acidosis, Hypocalcemia, Anemia, and Hypothermia on Functional Hemostasis in Trauma

Heiko Lier, MD, Henning Krep, MD, PhD, Stefan Schroeder, MD, PhD, and Frank Stuber, MD, PhD

Background: Beside the often discussed topics of consumption and dilution coagulopathy, additional perioperative impairments of coagulation are caused by acidosis, hypocalcemia, anemia, hypothermia, and combinations.

Methods: Reviewing current literature, cutoff values of these parameters become obvious at which therapy should commence.

Results: A notable impairment of hemostasis arises at a pH ≤7.1. Similar effects are caused by a BE of −12.5 or less. …ere bleeding, buffering … pH values is recom… with massive transfu… …s displaying exhausted … systems. It completes … From the hemostatic point of view, the optimal Hct is higher than the one required for oxygenation. Even without a "classical" transfusion trigger, the therapy of acute, persistent bleeding should aim at reaching an Hct ≥30%.

A core temperature of ≤34°C causes a decisive impairment of hemostasis. A controlled hypotensive fluid resuscitation should aim at reaching a mean arterial pressure of ≥65 mm Hg (possibly higher for cerebral trauma). Prevention and later aggressive therapy of hypothermia by exclusive infusion of warmed fluids and the use of warming devices are prerequisites for the cure of traumatic coagulopathy.

Combined appearance of single preconditions cause additive impairments of the coagulation system.

Conclusions: The prevention and timely correction, especially of the combination acidosis plus hypothermia, is crucial for the treatment of hemorrhagic coagulopathy.

Key Words: Blood coagulation, Coagulopathy, Acidosis, Hypocalcemia, Anemia, Hypothermia.

J Trauma. 2008;65:951–960.

32-årig kvinna

En natt på förlossningen

Dag 0, kl 00.28

- Frisk, 3 para, gravid v 35
- Status
  - Illamående
  - Svår smärta
  - Kan inte ligga still
  - Mjuk i buken
- Ultraljud: foster ok
- Inj Opioid iv

Dag 0, kl 01.22

- CTG
  - Frekvens 120, initialt
  - Bradykardi, frekvens 60
- Omedelbart kejsarsnitt

Dag 0, kl 01.45

- Partus, en pojke
- Oxytocin 5 U + 5 U
- Metylergometrine
- Blödning 200 ml
- Uterus, kontraherad
- Lever svullen?

En vanlig natt på operation salen?

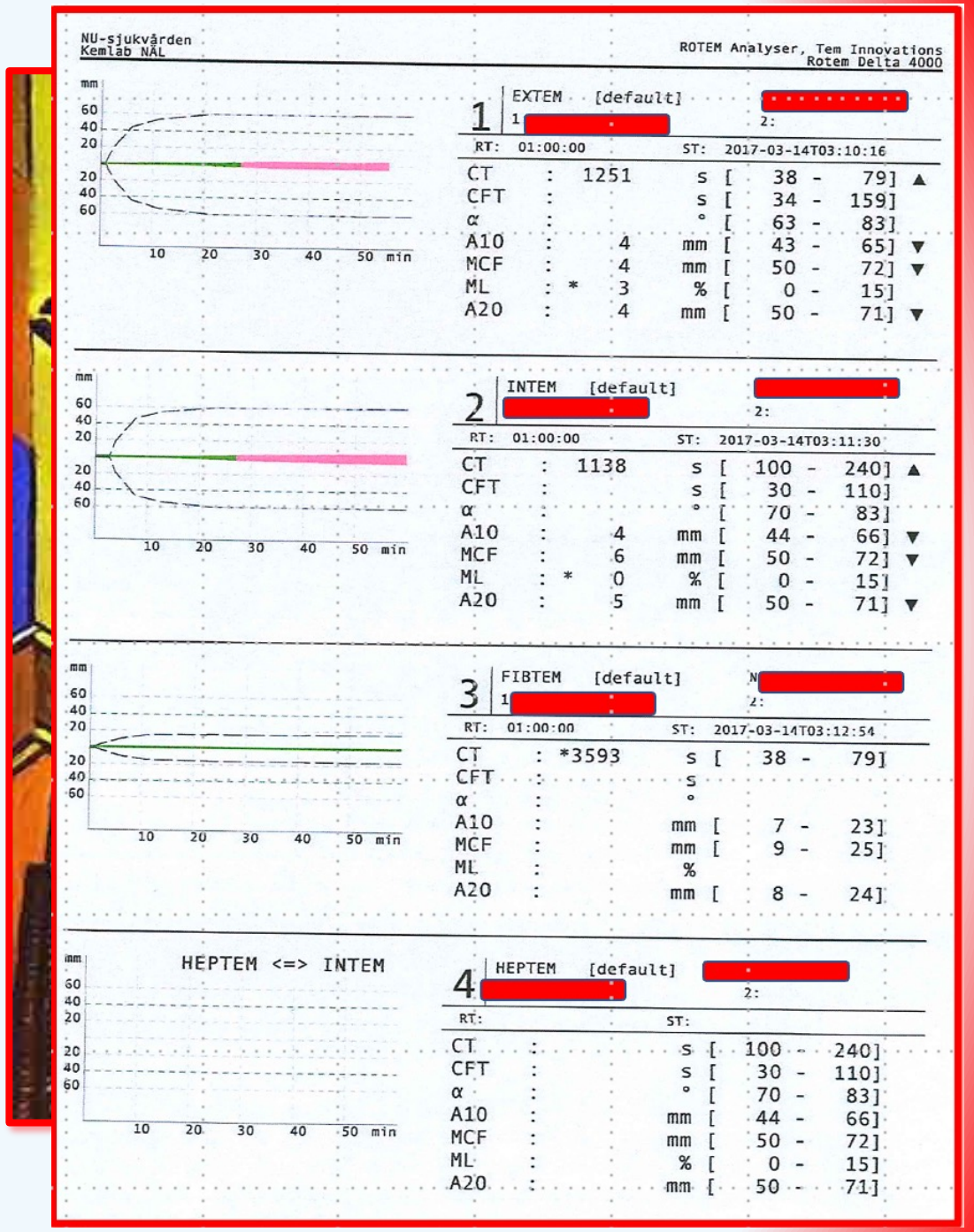
Dag 0, kl 03.12

- Vaginal blödning, 1100 ml
- Tranexamsyra 2 g
- Oxytocin infusion
- Karboprost
- Blod prover, hemolys
- Transfusion
  - Blod 4 enheter
  - Plasma 2 enheter
- ROTEM
- Diagnos?

Vad göra?

1. Ge blod och plasma
2. Ge Fibrinogen 4 g
3. Ge Tranexamsyra
4. Ge allt

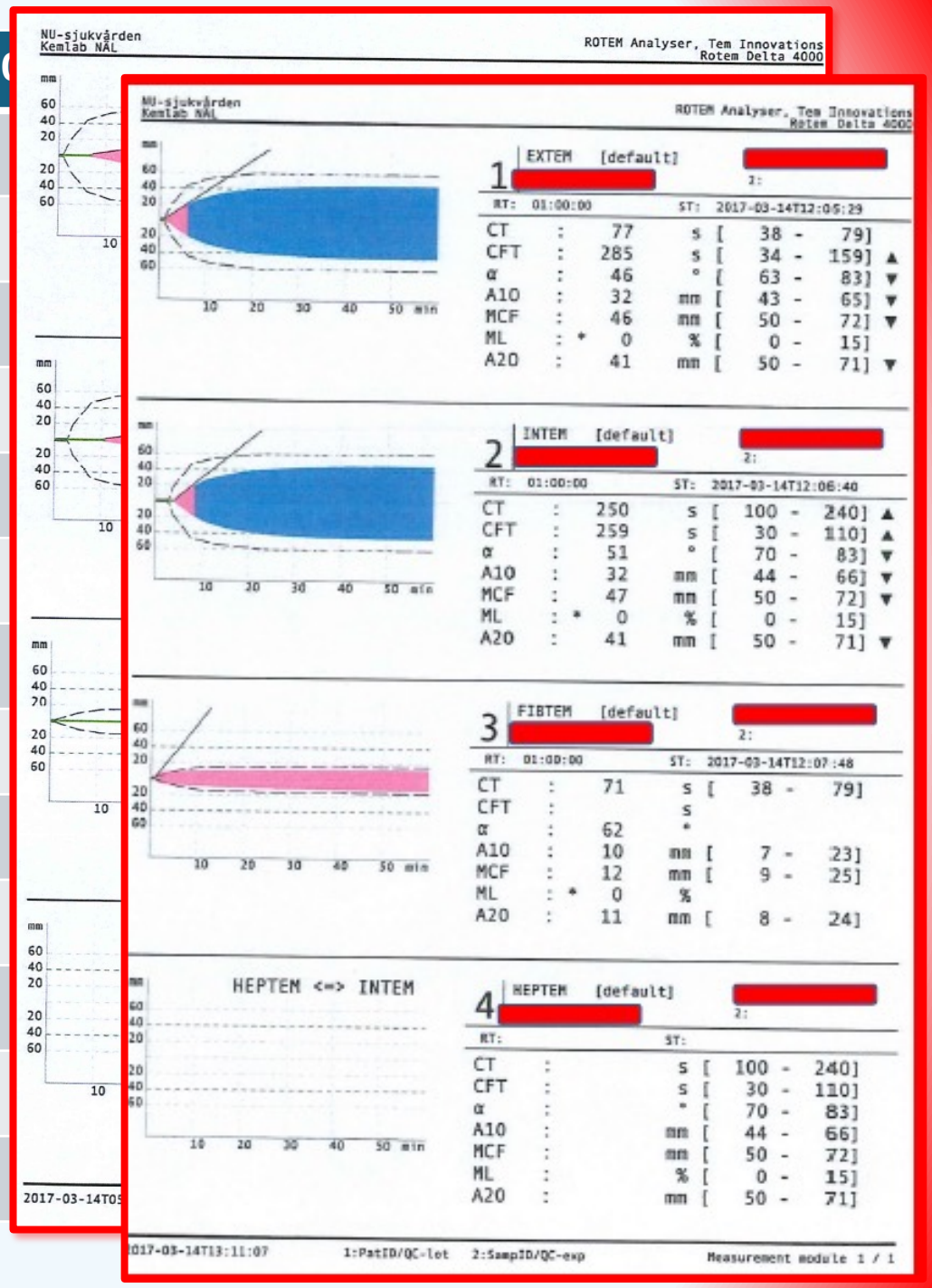
Fibrinogen 4 g



Day 0-2	01:00	04:00	06:00	11:30	14:30	20:30	03:(
Hb	121	131					
LPK	17.5	21.8					
Platelet	156	83					
CRP	6	4					
Asat	Hem	Hem					
Alat	Hem	29					
Bilirubin	Hem	Hem					
Creatinine	Hem	Hem					
PT(INR)	Hem	1.2					
APTT	Hem	Hem					
Fibrinogen	Hem	-					
AT	0.48	-					
Rotem	03:10	04:30					

Dag 0, kl 05.00 i IVA

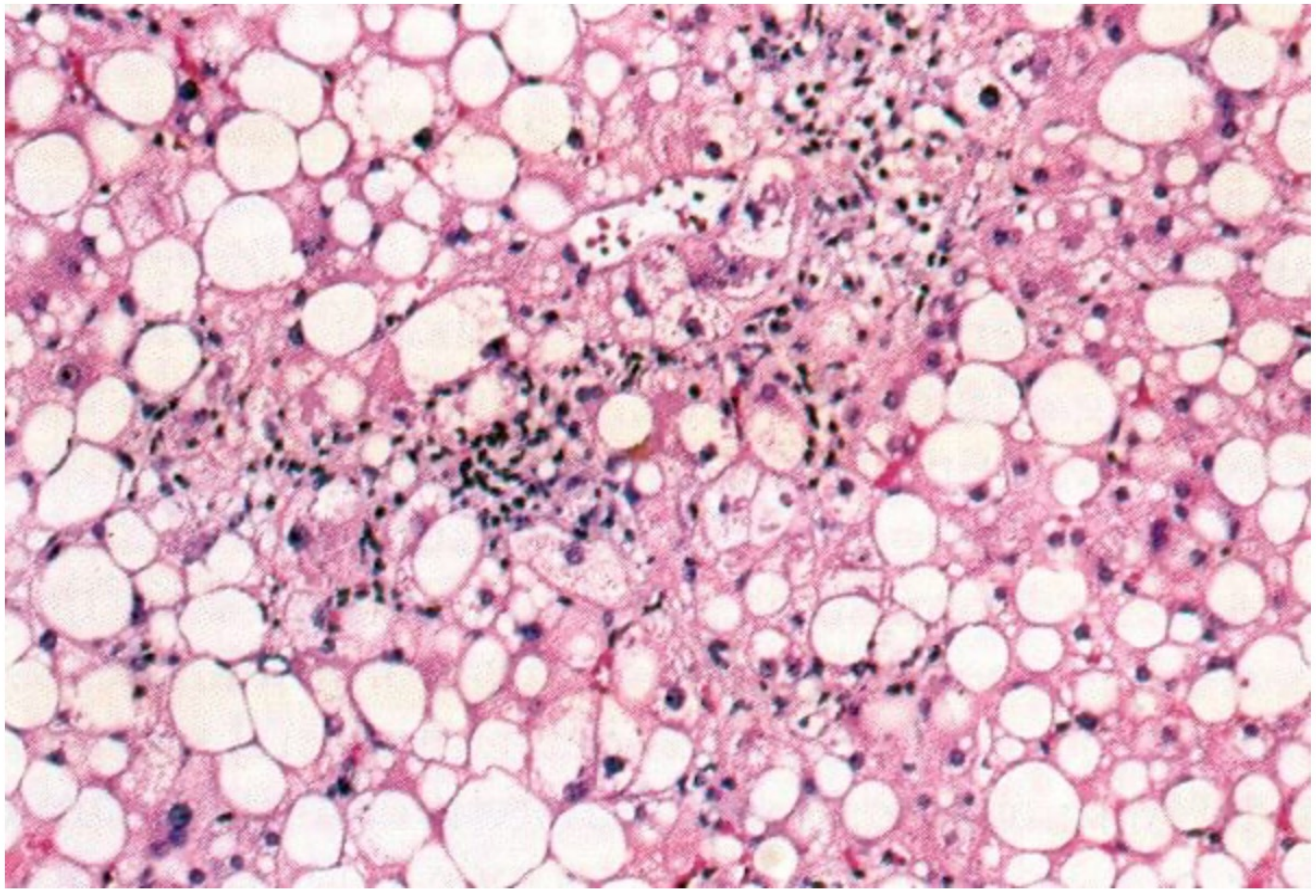
- Sivar kontinuerligt
- Upprepade Rotem
- Blod prover hemolys
- Blod 2 enheter
- Plasma 7 enheter
- Trombocyter 3 enheter
- Fibrinogen 3 + 3 g
- Ballong tamponad
- Uterus bra kontraherad
- Diagnos?



Under några vanliga dagar på IVA

Diagnos
Akut Fett Lever
Reflektioner

- Teamet visste inte diagnosen
- Bra vård pga Rotem



Dag 0 - 8

- Blod, totalt 9 enheter
- Plasma, totalt 12 enheter
- Trombocyter, totalt 8 enheter
- Fibrinogen, totalt 10 g
- Respirator dag 1-4
- Dialys CRRT dag 3-8
- Sjukhusvård 3 veckor

34-årig kvinna

Diagnos?

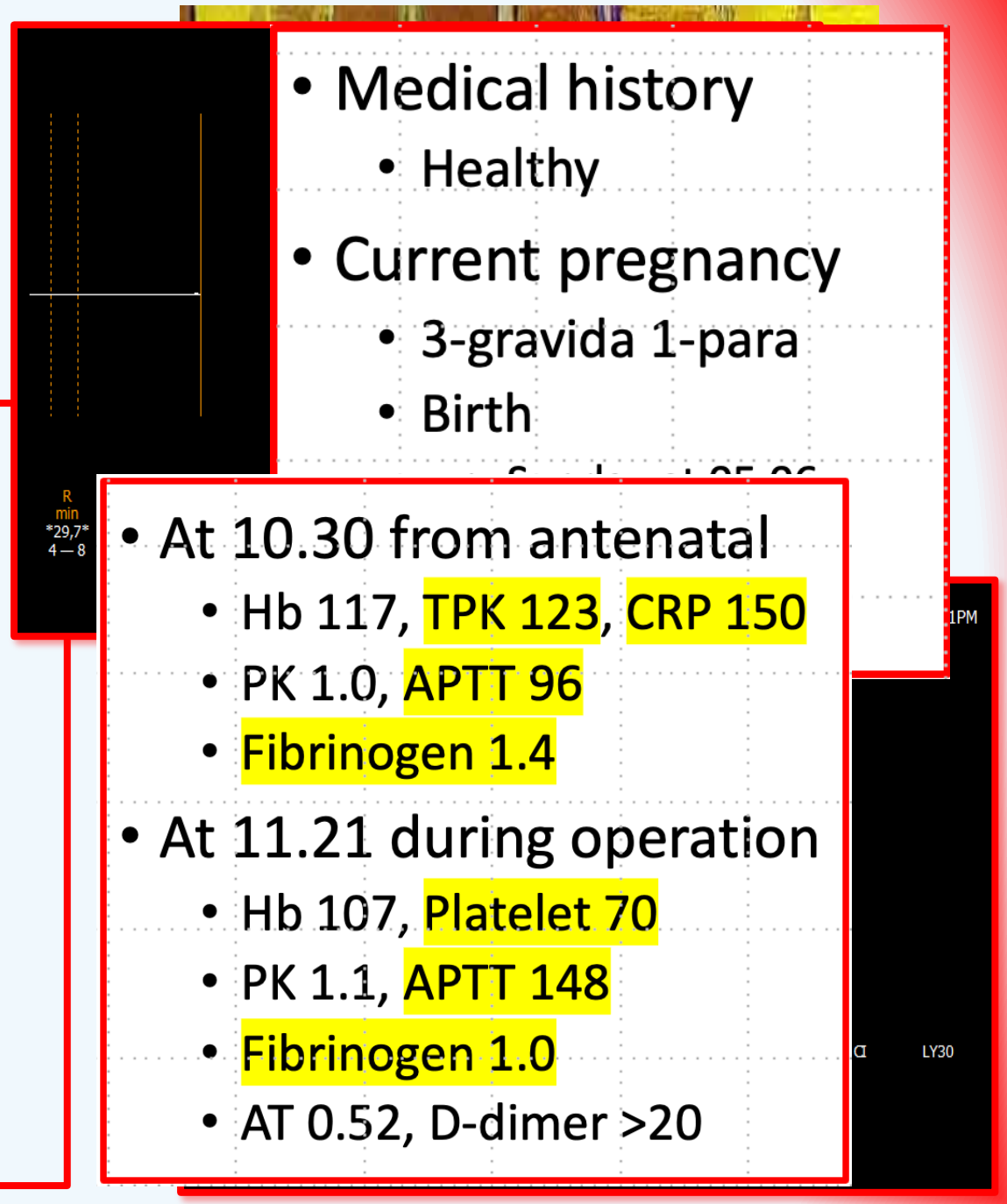
Diagnos?

1. Tone
   PPH pga atoni
2. Trauma
   PPH pga förlossningsskador
3. Tissue
   PPH pga placentarester
4. Thrombin
   DIC pga sepsis

En tisdag runt lunch:
Manuell exploration pga PPH
Frisk kvinna, aorta kompression

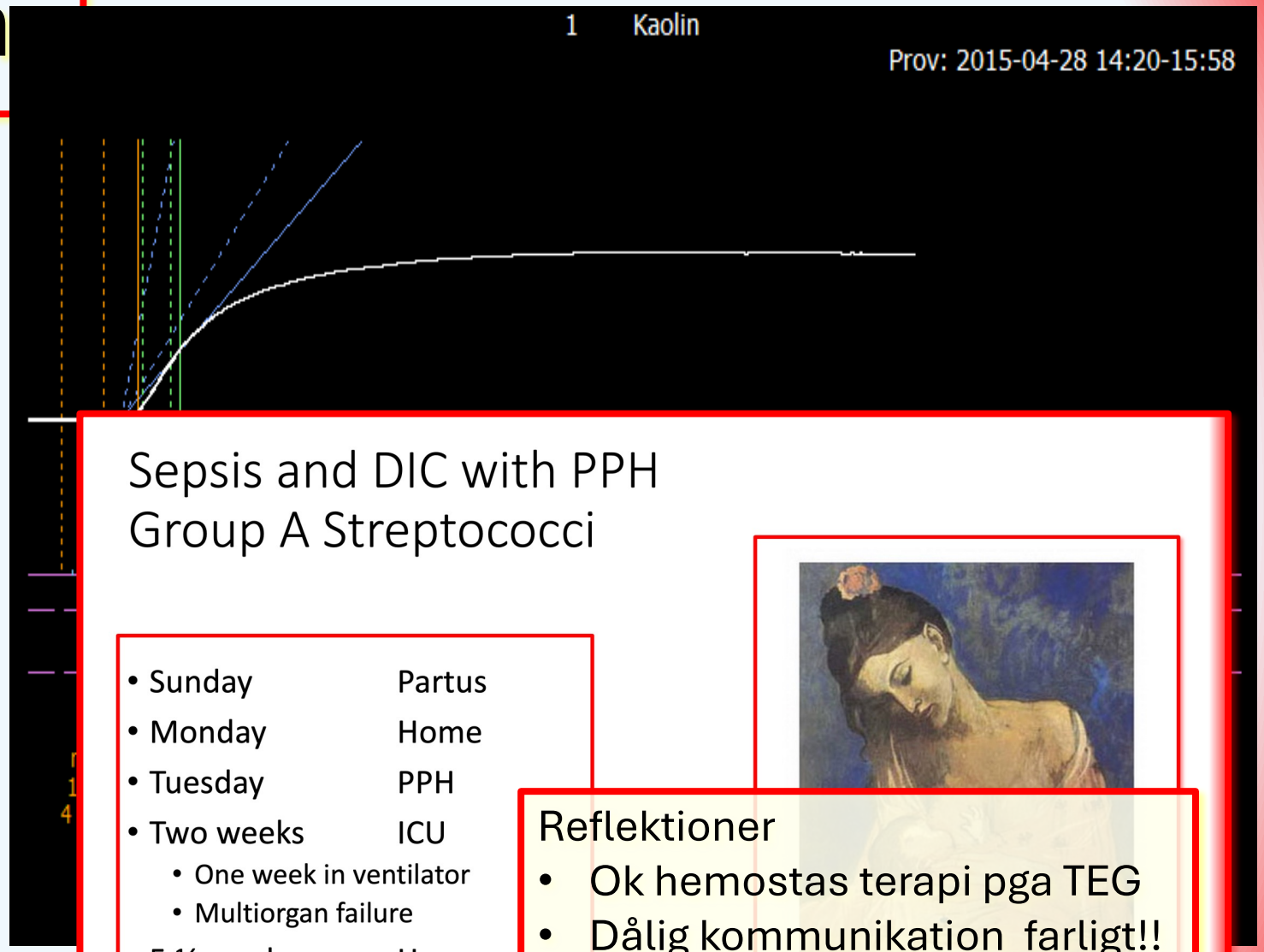
En liten stund senare

- Generell anestesi →
  - Cirkulatorisk chock
- Mörjiga placentarester?
- Oxytocin, metylergometrin, karboprost and misoprostol pga atoni
- Ballong tamponad
- Blöder från ytliga bristningar
- Ytterligare 1000 ml blödning



Under operationen

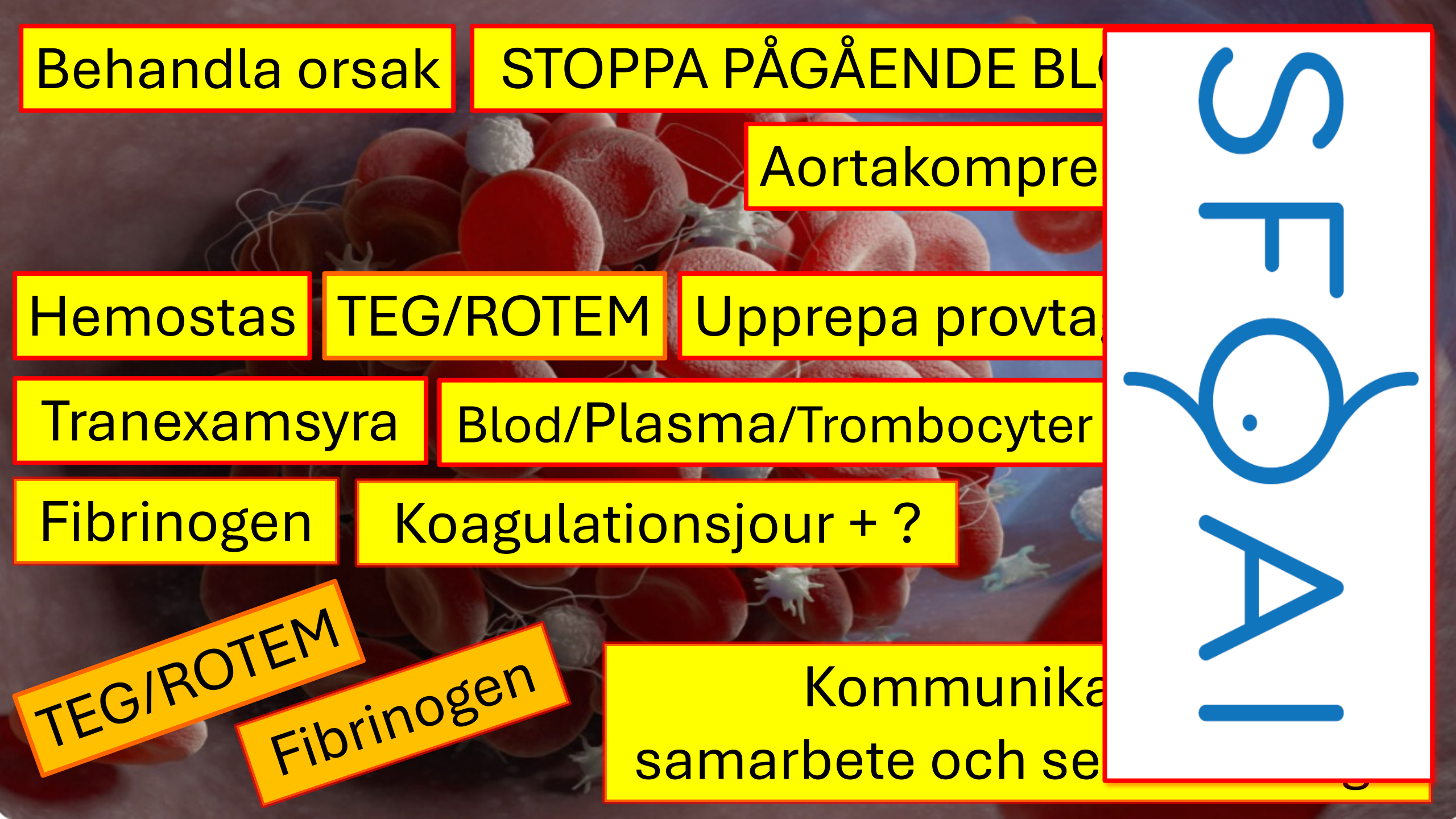
- Kristalloid
- Uterotonika
- Noradrenalin
- Tranexamsyra
- Blod 2 enh, Plasma 2 enh
- Fibrinogen 2 + 2 gram
- Blödning stannar
- Tazocin + Nebcina
- Till IVA i respirator
- Och ny TEG



Sepsis and DIC with PPH
Group A Streptococci

• Sunday	Partus
• Monday	Home
• Tuesday	PPH
• Two weeks	ICU
• One week in ventilator	
• Multiorgan failure	
• 5 ½ weeks	Home

Reflektioner
- Ok hemostas terapi pga TEG
- Dålig kommunikation farligt!!


Behandla orsak
STOPPA PÅGÅENDE BL
Aortakompre
Hemostas
TEG/ROTEM
Upprepa provta
Tranexamsyra
Blod/Plasma/Trombocyter
Fibrinogen
Koagulationsjour + ?
TEG/ROTEM
Fibrinogen
Kommunika
samarbete och se
SFOAI