Obstetrisk blödning!

Obstetrisk anestesi 2024

Ove Karlsson, MD PhD docent

Sahlgrenska, Sverige och världen

Stor obstetrisk blödning

- Statistik
- MBRRACE, UK
- Nationell input
- Initialt omhändertagande
- Uterotonika mm
- Hemostas
- Anestesiaspekter
- Med mera…..

En vanlig natt på förlossningen

Dag 0, kl 23.38

- Telefonsamtal
- Frisk
- 3 para
- Gravid v35+1
- MVC, blodtryck 110/65, ingen proteinuri dock illamående
- Ont epigastriet sedan 1 timme
- Hälsas välkommen

Dag 1, kl 00.28

- Klinik
  - Ont epigastriet
  - Illamående
  - Smärtpåverkad, kan ej ligga still
  - Mjuk buk
- Ultraljud: HF ua, FR ua, placenta ua
- Inj Ketogan iv

En vanlig natt på förlossningen?

Dag 1, kl 01.22

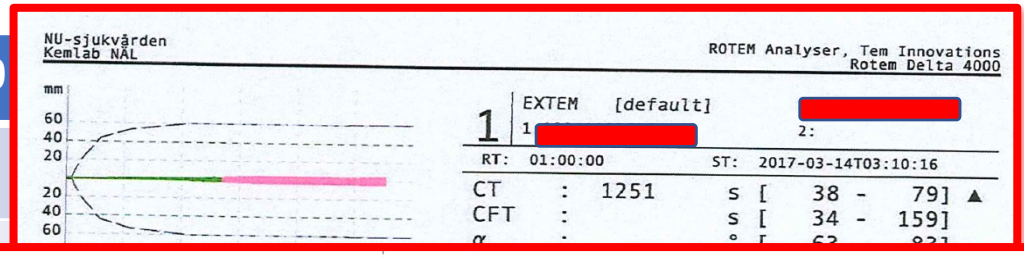
- CTG
  - Inskränkt variabilitet
  - Komplexa variabla decelerationer
  - Frekvens initialt 120
  - Bradykardi, frekvens 60
- Larm, urakut kejsarsnitt

Dag 1, kl 01.45

- Födelse pojke
- Oxytocin 5 E + 5 E
- Methergin
- Blödning 200 ml initialt
- Uterus väl kontraherad
- Lever svullen?

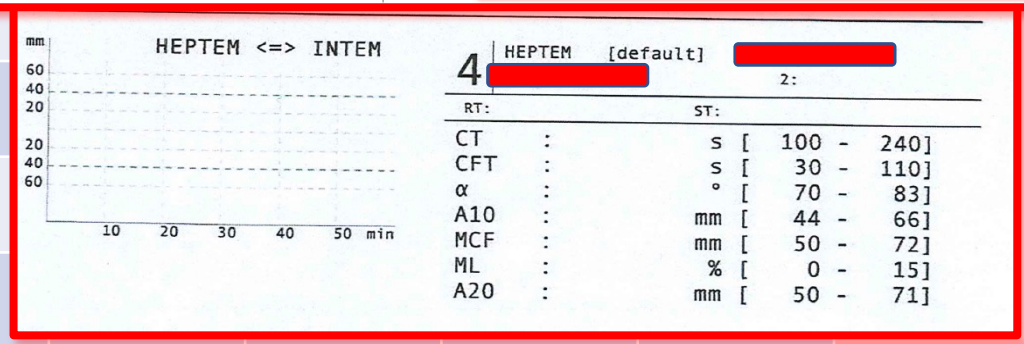
Dag 1-3	01:00	04:00	06:00	11:30	14:30	20:30
Hb	121					
LPK	17.5					
TPK	156					
CRP	6					
Asat	Hem					
Alat	Hem					
Bilirubin	Hem					
Kreat	Hem					
PK	Hem					
APTT	Hem					
Fib	Hem					
AT	0.48					
Rotem	03:10					

Fibrinogen 4 g



Diagnos?

1. HELLP
2. Hemostasrubbning
3. Hepatit
4. Autoimmun hepatit
5. Akut fettlever
6. Ingen aning



En vanlig natt på operationssalen

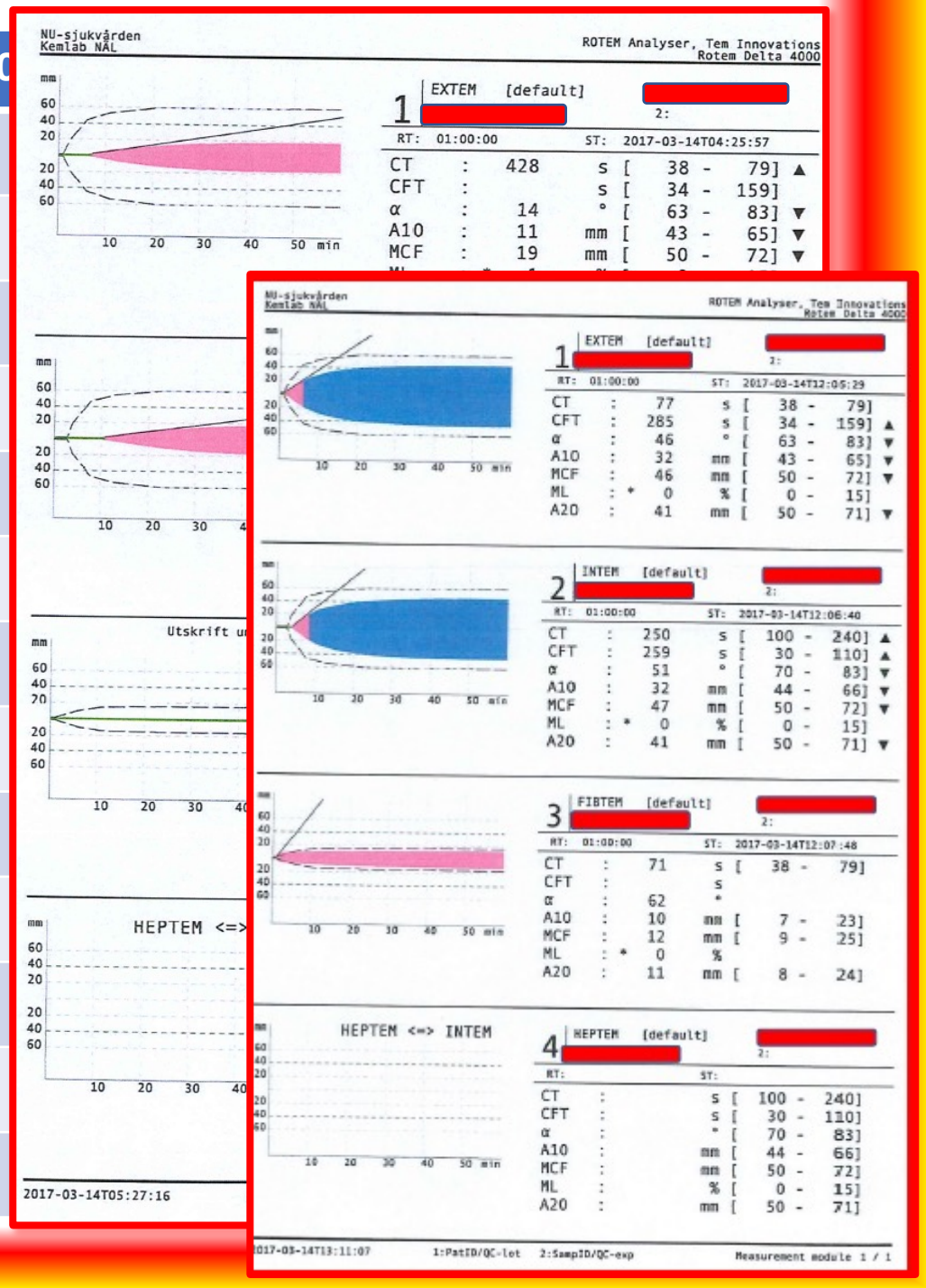
Dag 1, kl 03.12

- Blödning vaginalt, 1100 ml
- Tranexamsyra 2 g
- Oxytocin infusion
- Karboprost (Prostinfenem)
- Desmopressin (Octostim)
- Blodprover hemolys
- Transfusion, 4 blod + 2 plasma
- Rotem
- Diagnos?

Dag 1-3	01:00	04:00	06:00	11:30	14:30	20:30	03:0
Hb	121	131					
LPK	17.5	21.8					
TPK	156	83					
CRP	6	4					
Asat	Hem	Hem					
Alat	Hem	29					
Bilirubin	Hem	Hem					
Kreat	Hem	Hem					
PK	Hem	1.2					
APTT	Hem	Hem					
Fib	Hem	-					
AT	0.48	-					
Rotem	03:10	04:30					

Dag 1, kl 05.00 IVA

- Fortsätter siva från uterus
- Intuberad respirator
- Blodprover hemolys
- Bakri ballong
- Tamponad vagina
- Uterus väl kontraherad
- Diagnos?
- Mer blod, FFP, trombocyter och fibrinogen



Akut fettlever, behandling

- Avsluta graviditet
- Om tid finns
  - Stabilisera patient
  - Optimera hemostas
- Undvik ytterligare leverskada
  - Intensivvård
  - Optimera cirkulation, hjärtminutvolym och blodtryck
  - Undvik vissa LM
  - Acetylcystein?
- Farmakokinetik och farmakodynamik ändrad
- Samarbete och kommunikation
- Levertransplantation vb

SGF Nationella Riktlinjer
2014

På uppdrag av Svensk Gastroenterologisk Förenings styrelse

Nationella riktlinjer
för utredning samt handläggning av

Leversjukdom under graviditet – graviditet vid leversjukdom

2013-10-25

Kontaktperson: Hanns-Ulrich Marschall, Medicinkliniken, Sahlgrenska Universitetssjukhuset, 413 45 Göteborg, 070-8774073, hanns-ulrich.marschall@gu.se

Medlemmar i expertgruppen

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olof.stephansson@ki.se

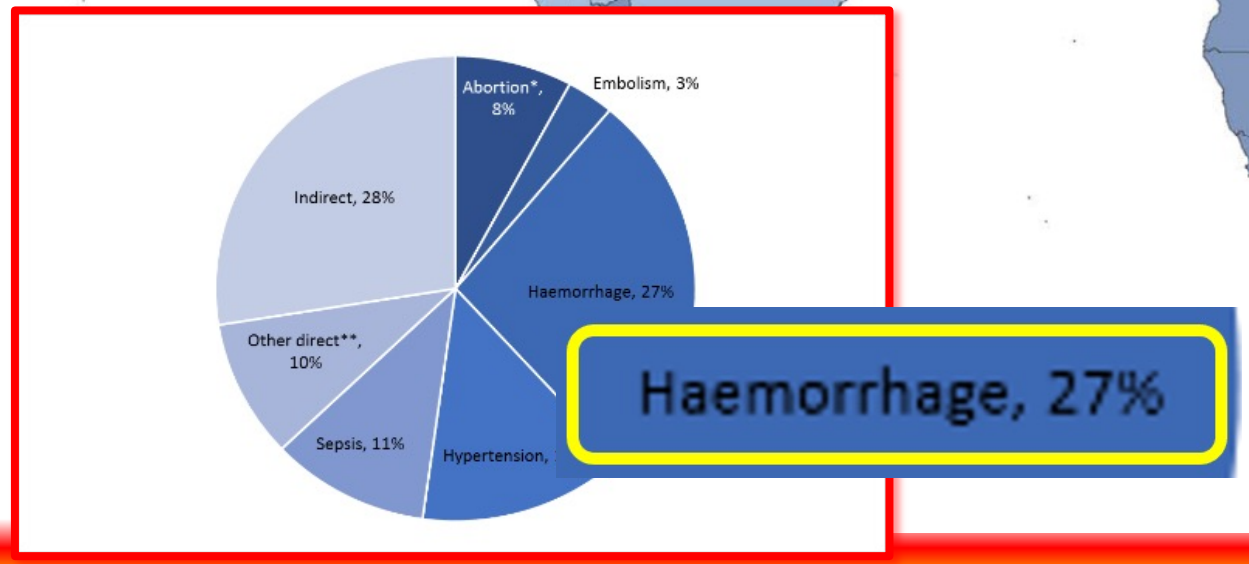
nliga dygn på IVA

- 8

- od 3 st (tot 9 blod)
- P 3 st (tot 12 FFP)
- ombocyter 5 st (tot 8 st)
- Fibrinogen (tot 10 g)
- Respirator dag 1-4
- Dialys CRRT dag 3-8
- Sjukhusvård 3 veckor

- FFP 7 st
- Trombocyter 3 st
- Fibrinogen 3 + 3 g
- Tranexamsyra 2 g

Maternal mortality ratio (MMR) estimates, by country, 2020



Haemorrhage, 27%

< 20
20–99
100–299
300–499
500–999
≥ 1000
Data not available
Not applicable

Maternal, Newborn and Infant Clinical Outcome Review Programme

MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK

Saving Lives,

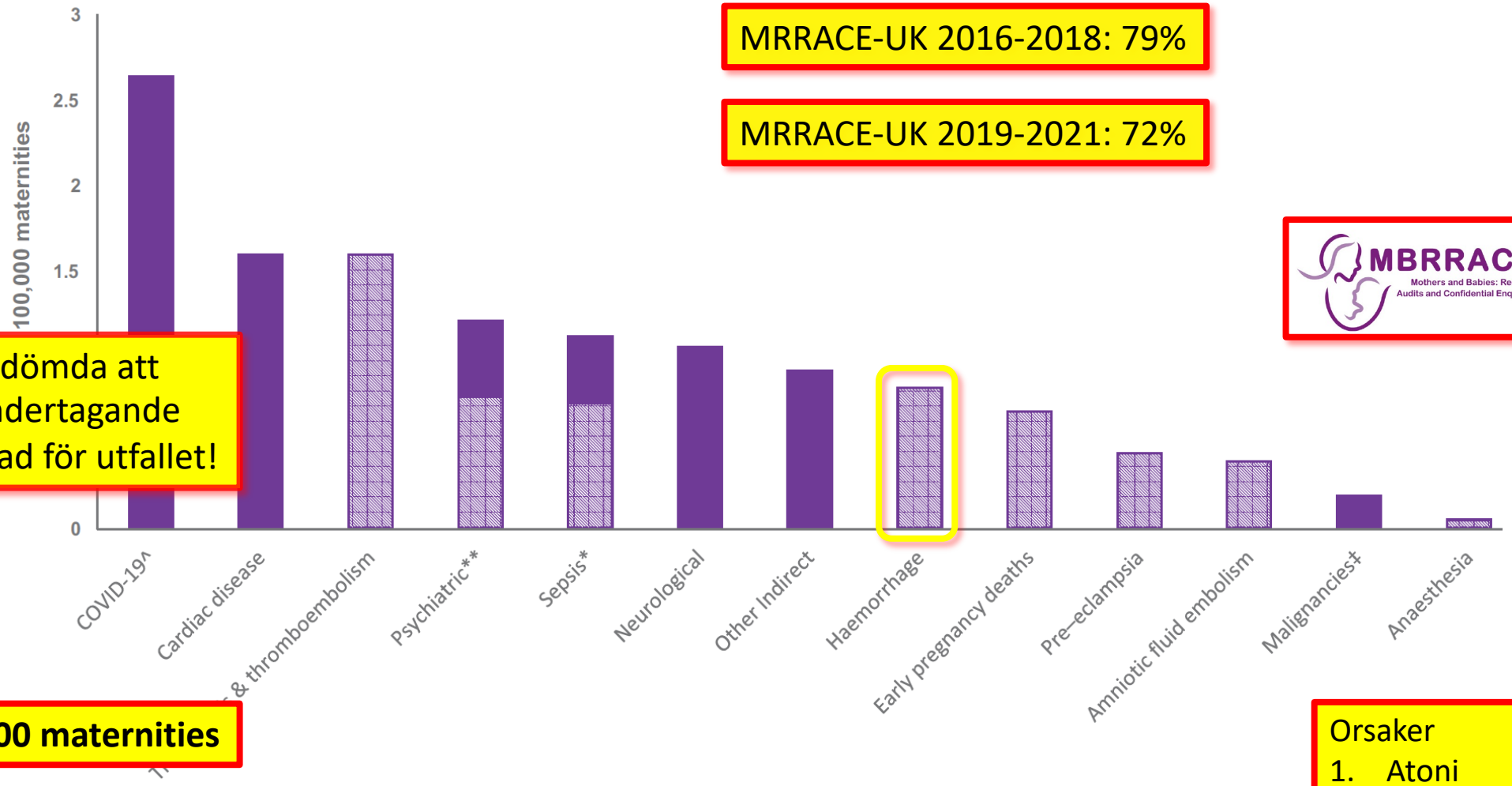
Lessons learned to
the UK and Ireland
into Maternal Deat
2019-21

Compiled report includir
supplementary material

MBRRACE-UK 2009-2012: In all patients (100 %) with mortality due to haemorrhage, improvements in care may have made a difference to the outcome

MRRACE-UK 2016-2018: 79%

MRRACE-UK 2019-2021: 72%



MBRRACE-UK
Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK

52 % av fallen bedömda att ett bättre omhändertagande skulle gjort skillnad för utfallet!

11.7 per 100.000 maternities

Orsaker
1. Atoni
2. Placenta accreta
3. Ablatio
4. Förlossningsskador

Key messages

1. Communication, ownership and teamwork

- Kalla på seniora kollegor
- Helikoptervy
- Patientnära instrument
- Blod, plasma, trombocyter och fibrinogen
- Multidisciplinära team
- PPH protokoll, varma
- Stort blödningslarm
- Monitorera blödning, vätskor, blod och läkemedel
- Spädningskoagulopati
- Korrelera blödning till pat
- NEWS 2, identifiera blödning
- Teamträning PPH
- Centra för invasiv placenta

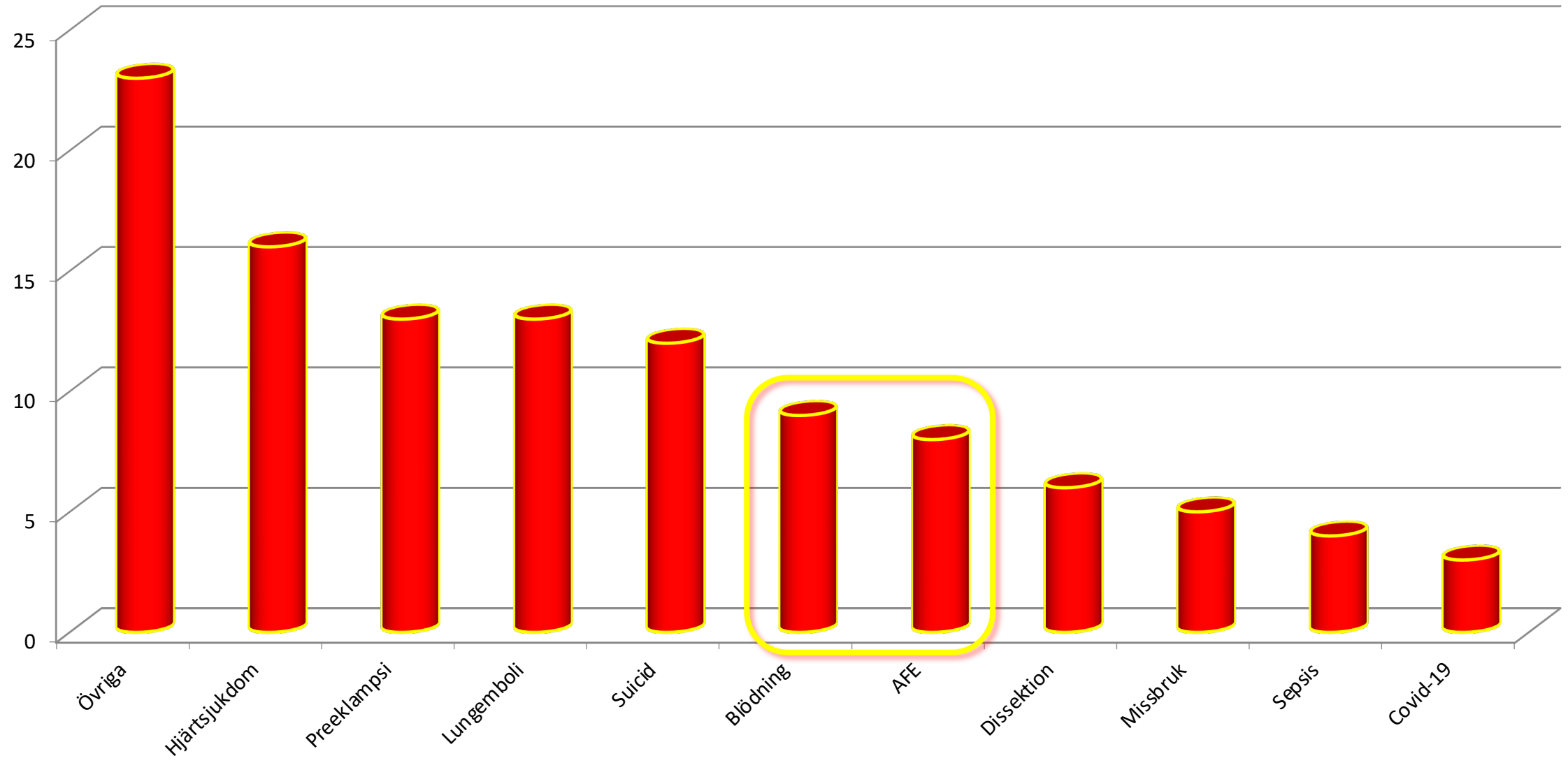
New recommendations

- Uppdatera instruktioner för hemostas-test
- Hur man tolkar test och använder resultat
- Upprepa provtagning, ett prov ger ingen klar bild
- Uppdatera instruktioner för ballong-tamponad
- Centra för patienter med invasiv placenta

Existing guidance and recommendations requiring improved implementation

The elective delivery of women with placenta accreta spectrum should be managed by a multidisciplinary team, which should include senior anaesthetists, obstetricians and gynaecologists with appropriate experience in managing the condition and other surgical specialties if indicated. In an emergency, the most senior clinicians available should be involved (Royal College of Obstetricians and Gynaecologists 2018).

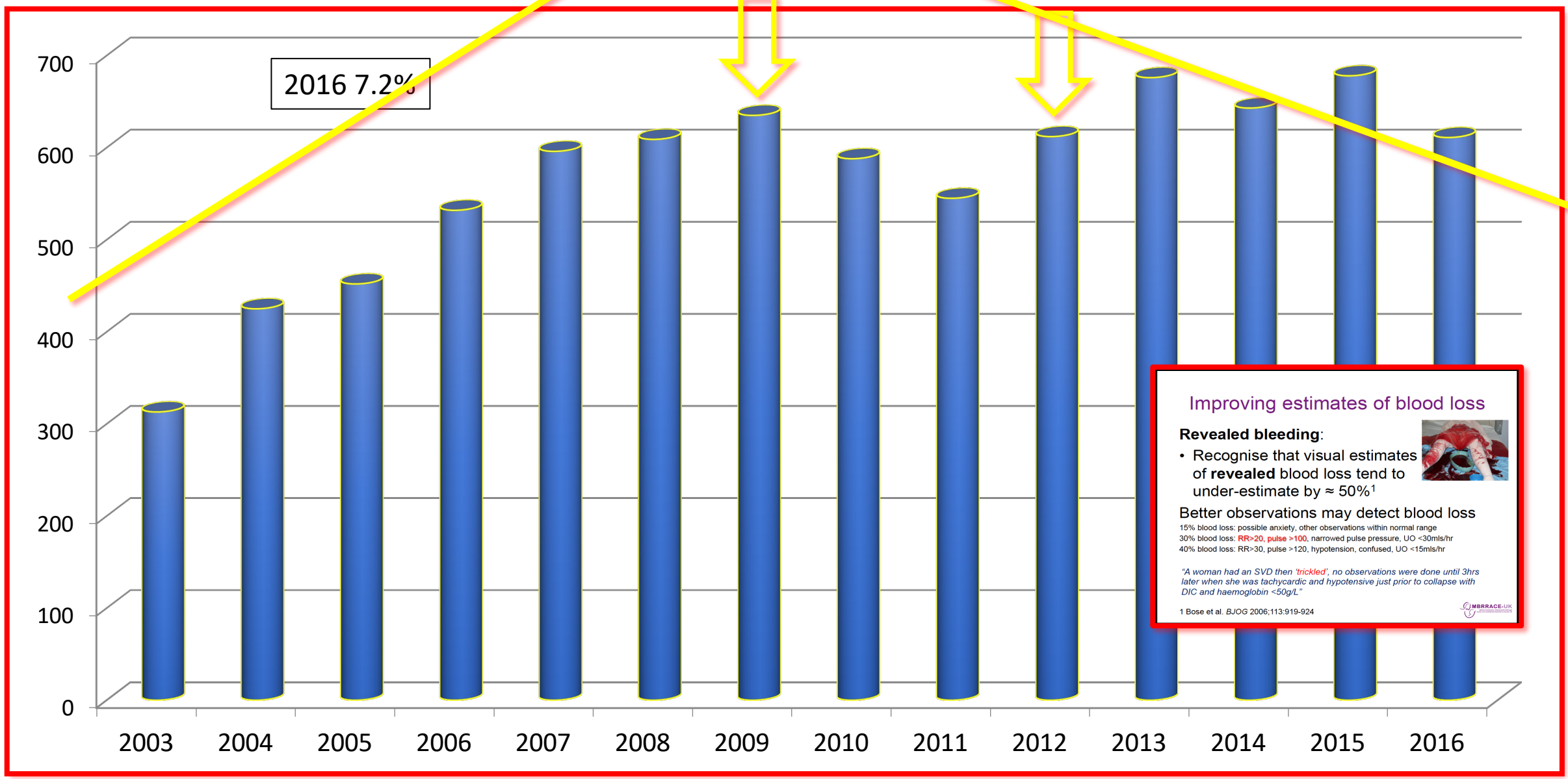
Mödradödlighet Sverige 2007-2023



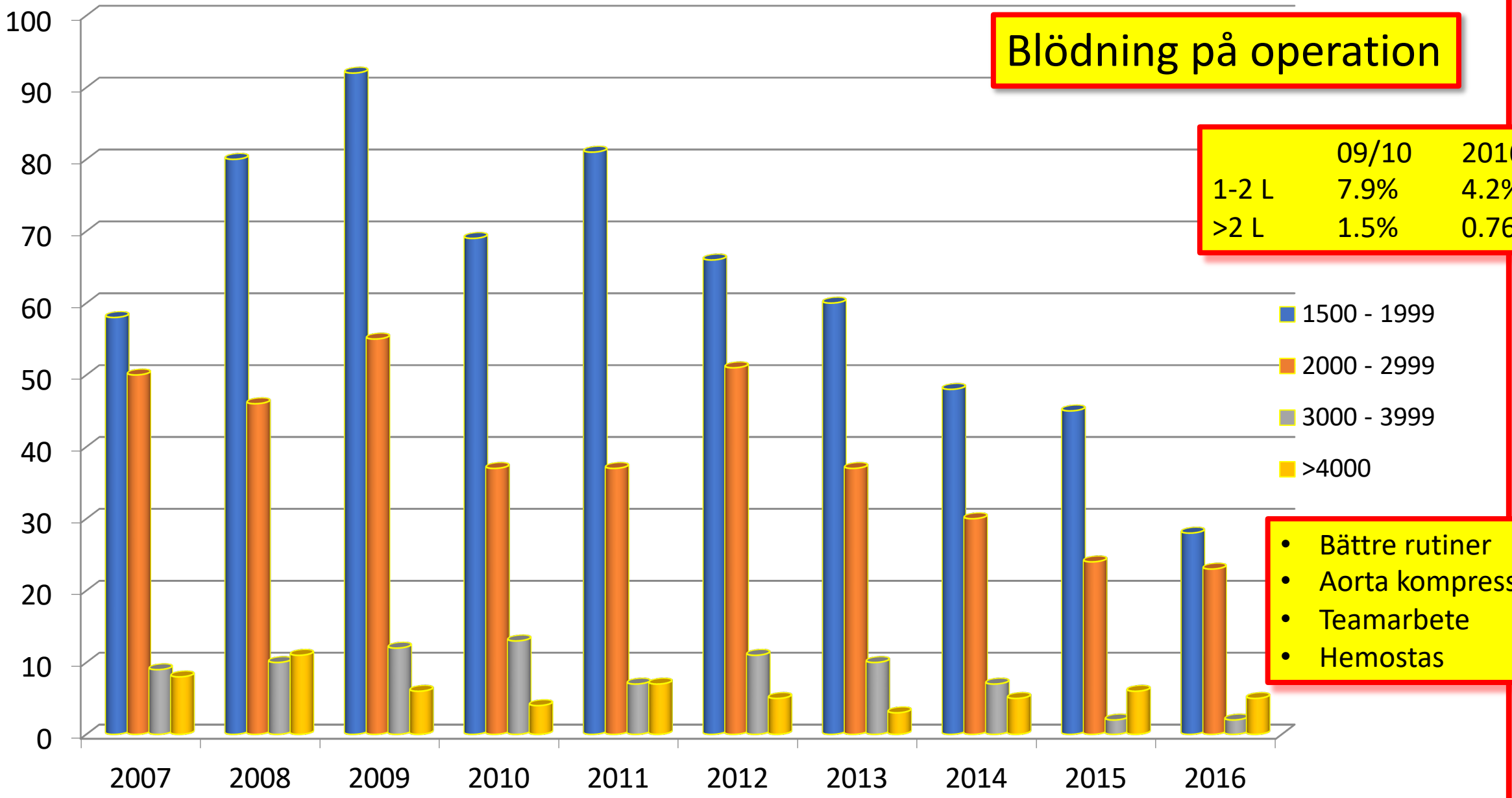
Stora blödningar

- Ökad mortalitet
- Ökad morbiditet
- Transfusionskomplikationer:
  - Infektioner
    - Virus
    - Bakteriell kontamination
    - Okända patogener
  - Immunologiska reaktioner
    - ABO inkompatibilitet
    - Hemolytisk transfusions reaktion
    - Anafylaxi
    - TRALI, transfusion related acute lung injury
- Stora kostnader

Vaginala förlossningar med blödning >1000 ml, Sahlgrenska Universitetssjukhuset



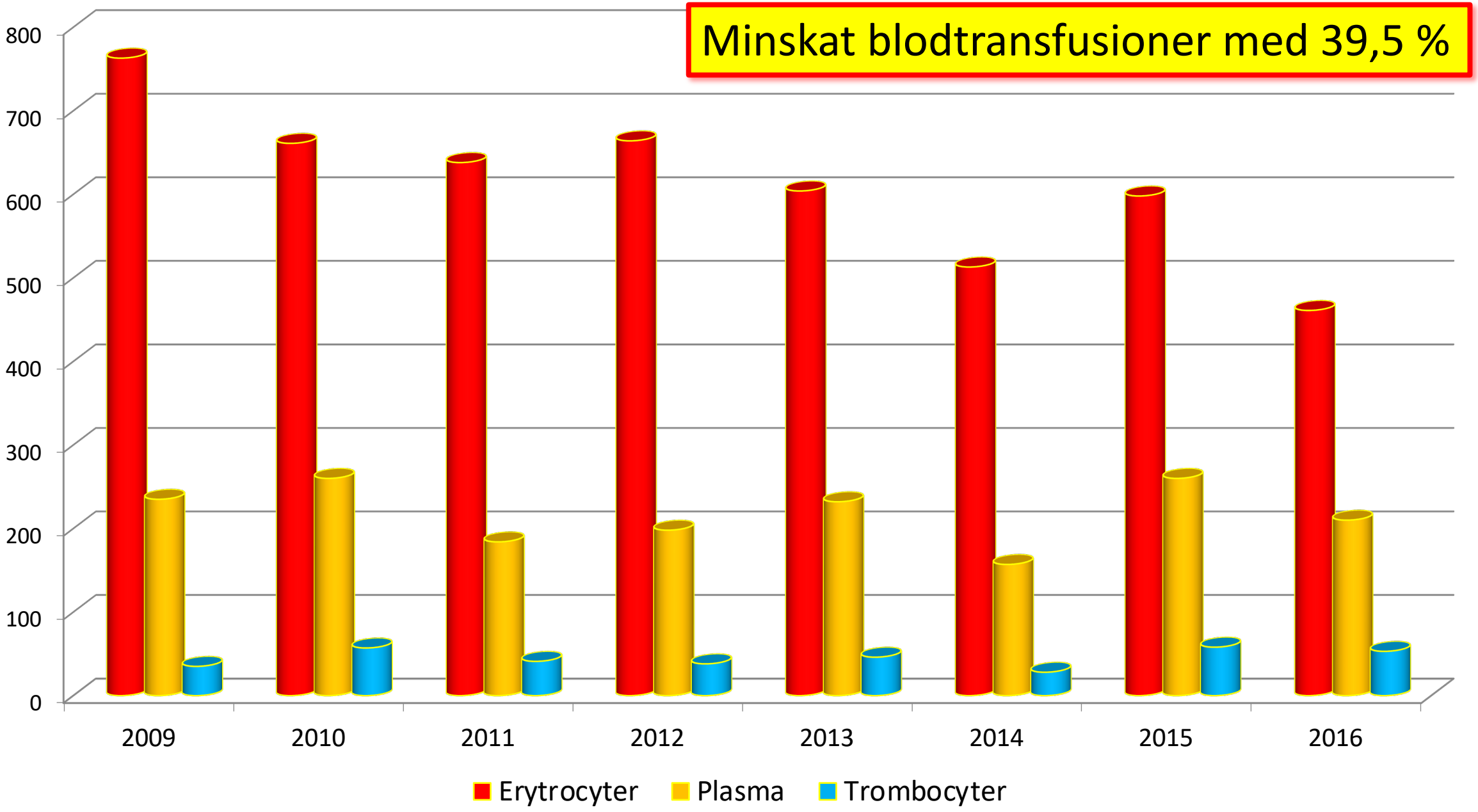
Blödning på operation



	09/10	2016
1-2 L	7.9%	4.2%
>2 L	1.5%	0.76%

- Bättre rutiner
- Aorta kompression
- Teamarbete
- Hemostas

Minskat blodtransfusioner med 39,5 %



Blödning och hypovolemi

	I	II	II	IV
Blödning	0,75-1	1-1,5	1,5-2	>2
HR	<100	>100	>120	>140
Bltr	↔	Vasokonst.	↓	↓↓
AF	↔	↑	↑↑	↑↑ ↑
Mental.st	↔	Lätt oro	Konfusion	
Kap.refill	↔	> 2s	> 3s	> 3s

Orsaker ...tora postpartumblöd-ningar ...innas)	Komplikation	%
Ton...	Atoni Placentaavlossning	50-80
Trauma	...rlossningsskador ...	15-35
"Tissue"	Plac... Placenta p... Placenta accreta Placentaavlossning	10
Trombin	Koagulationsrubbning Placentaavlossning	...

STOPPA BLÖDNINGEN

Circulation during partus

Blood flow to uterus **700 ml /min**

Placenta, arterial bleeding

Atony, match wide arteries

5 minutes bleeding without contraction

3500 mL

Behandling av stor postpartum blödning:

1. Profylax mot stor blödning
2. Initial behandling
3. Farmakologisk behandling
4. Kirurgisk behandling
5. Hemostas
6. Anestesi
7. Övrigt

Doknr. i Barium	Dokumentserie	Giltigt fr o m	Version
20214	su/med	2015-06-08	6

Riktlinje Postpartumblödning - stor - behandling

Innehållsansvarig: Hans Bokström, Överläkare, Läkare obstetrik (hanbo2)
Godkänd av: Henrik Almgren, Verksamhetschef, Område 1 (henal1)
Denna rutin gäller för: Verksamhet Anestesi Operation IVA Östra; Obstetrik gemensamt

Medicinsk rådgivare

Lena Otterlind, Medicinskt ledningsansvarig

Ansvar

Gäller för personal inom de enheter/verksamheter som berörs av rutinen.
Ansvar för spridning och implementering har VEC/EC. Verksamhetschefen ansvarar för att rutinen finns och följer gällande författningar/lagar.

Revideringar i denna version

Rutinen är kompletterad med bilaga Instruktion aortakompression. Övrigt ersätter version ifrån 2014-11-10. Revidering enligt följande:

- Behandling för att förebygga postpartumblödning har lyfts ut i ett eget PM (se Förebyggande behandling av postpartumblödning)
- Läkare ska tillkallas vid blödning >500 ml (tidigare 600 ml)
- Under "Initial behandling" har voluven tagits bort och blödningsvagn införts (finns på alla förlossningsavdelningar)
- Prostinfenem och cytotec har lyfts ihop under samma punkt och situationen får avgöra vilken som väljs i första hand
- Sonoclot på Mölndal har ersatts av ROTEM
- Under mål för behandling under pågående blödning har HB ändrats till 90 (tidigare 100)

Arbetsbeskrivning

Tillkalla läkare, sätt nål och överväg aortakompression vid:
- Snabb blödning oavsett blödningsmängd
- Pågående blödning >500 ml
- Kvarhållen placenta 30 minuter efter partus oavsett blödning
- Större lösningsblödning där placenta inte kommer ut

Viktigt att väga och mäta all blödning.

A. Initial behandling vid stor blödning

- Håll **aortakompression**
- Huvudändan sänks och patienten ges syrgas 5-10 L/min på mask.
- Hämta blödningsvagnen
- Två **grova perifera nålar** sätts.
- **HB och bastest** tas.
- Kontroll av **BT och puls**.
- **KAD** sätts.
- Koppla förvärmd **Ringer-Acetat**
- Vid stor blödning ges **0 negativt blod** innan bastest är klar.
- Håll patienten varm!

För Mölndal: Finns 6 enheter. Meddela Lab när blodet avhämtas så nytt beställs omgående. Tfn: 3 0572, Blodbanks tfn Mölndals sjukhus.

Överväg någon gång under förloppet att ge injektion **Cyklocapron®** (tranexamsyra) **100mg/ml, 20 ml= 2 g**, ges långsamt i.v. 1 ml/min **Kontraindikation:** pågående blödning i urinvägarna (risk för koagelbildning)

Vid misstänkt placenta acreta eller tidigare stor blödning skall operation styras till plan 5 på KKÖ.

Akut postpartumblödning

ÖVERVÄG ALLTID AORTAKOMPRESSION OCH UTERUSKOMPRESSION

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

Steg 3
Blödning >1 000 ml
(eller kliniskt påverkad patient)

Säkerställ att åtgärder på steg 2 är utförda

- Kontroller enligt ONEWS2
- Syrgas 10 l/min
- Planläge, höjda ben
- Kroppsvarm Ringer-Acetat 1 l
- Tranexamsyra 1 g iv
- KAD

Steg 4
Blödning >1 500 ml

Time-out i teamet, utvärdera orsak och åtgärder

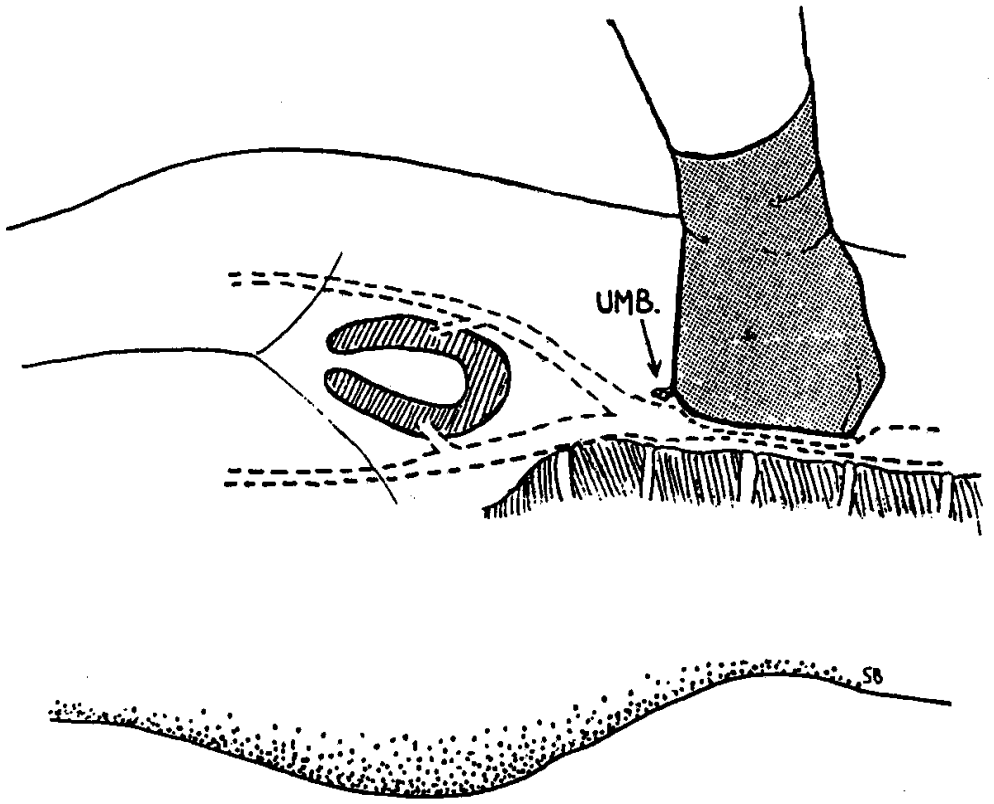
Överväg:

- Resursförstärkning (ex anestesiolog, bakjour)
- Fortsatt handläggning på operation
- Transfusion av blodprodukter
- Fibrinogen 2 − 4 g iv
- Följ blodprover: Hb, TPK, PK, APTt, S-Ca, Fibrinogen

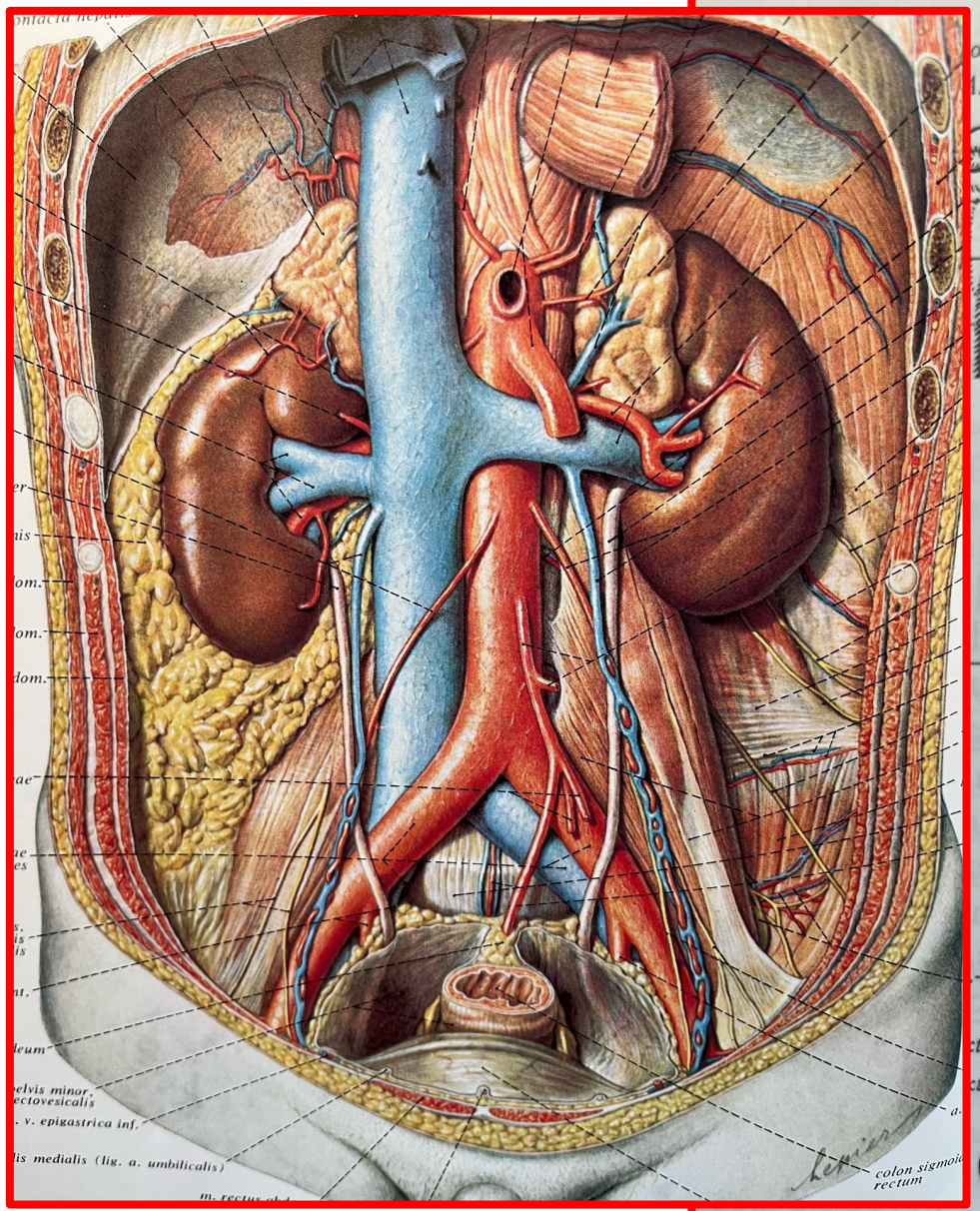
Väg all blödning kontinuerligt

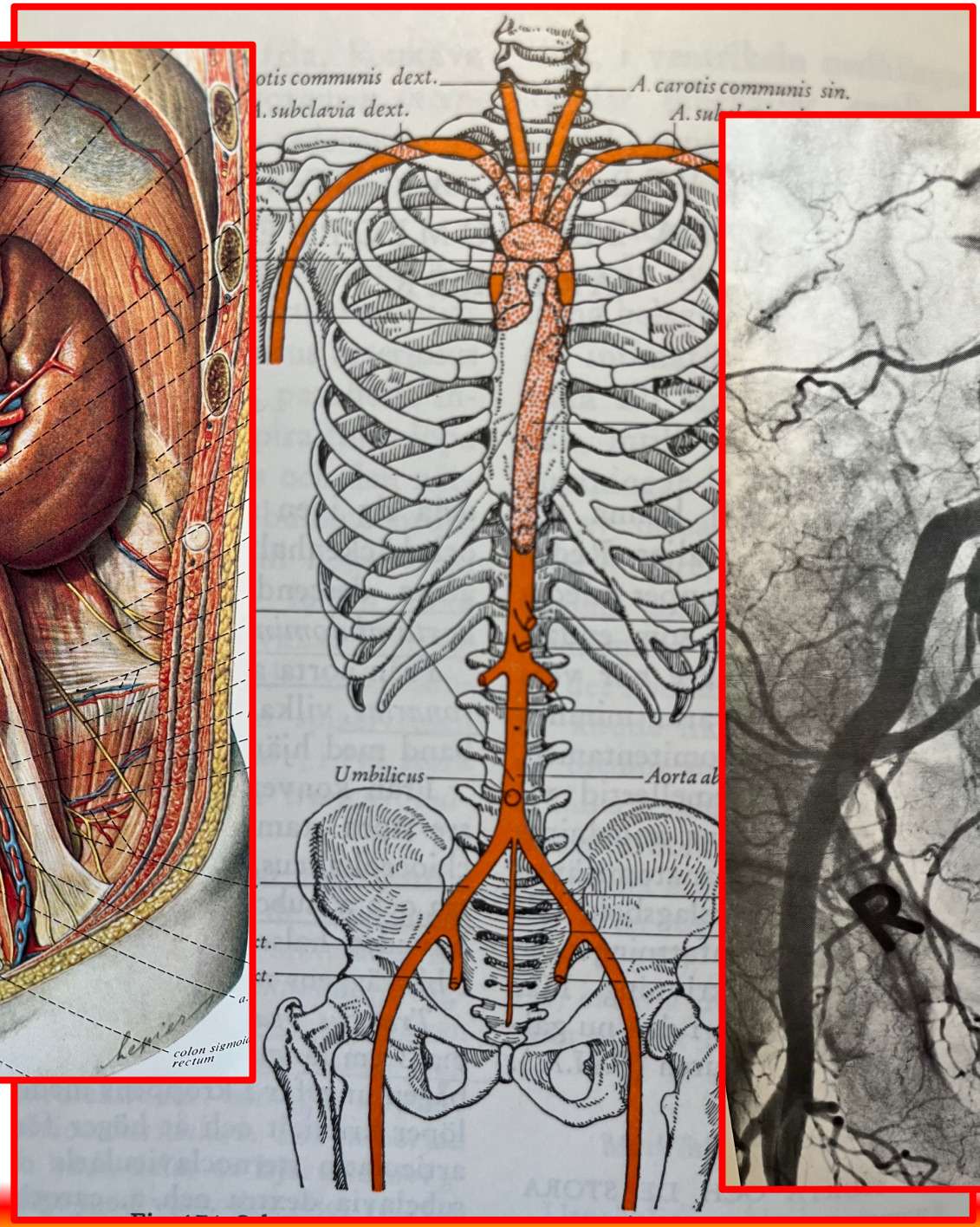
Initial behandling

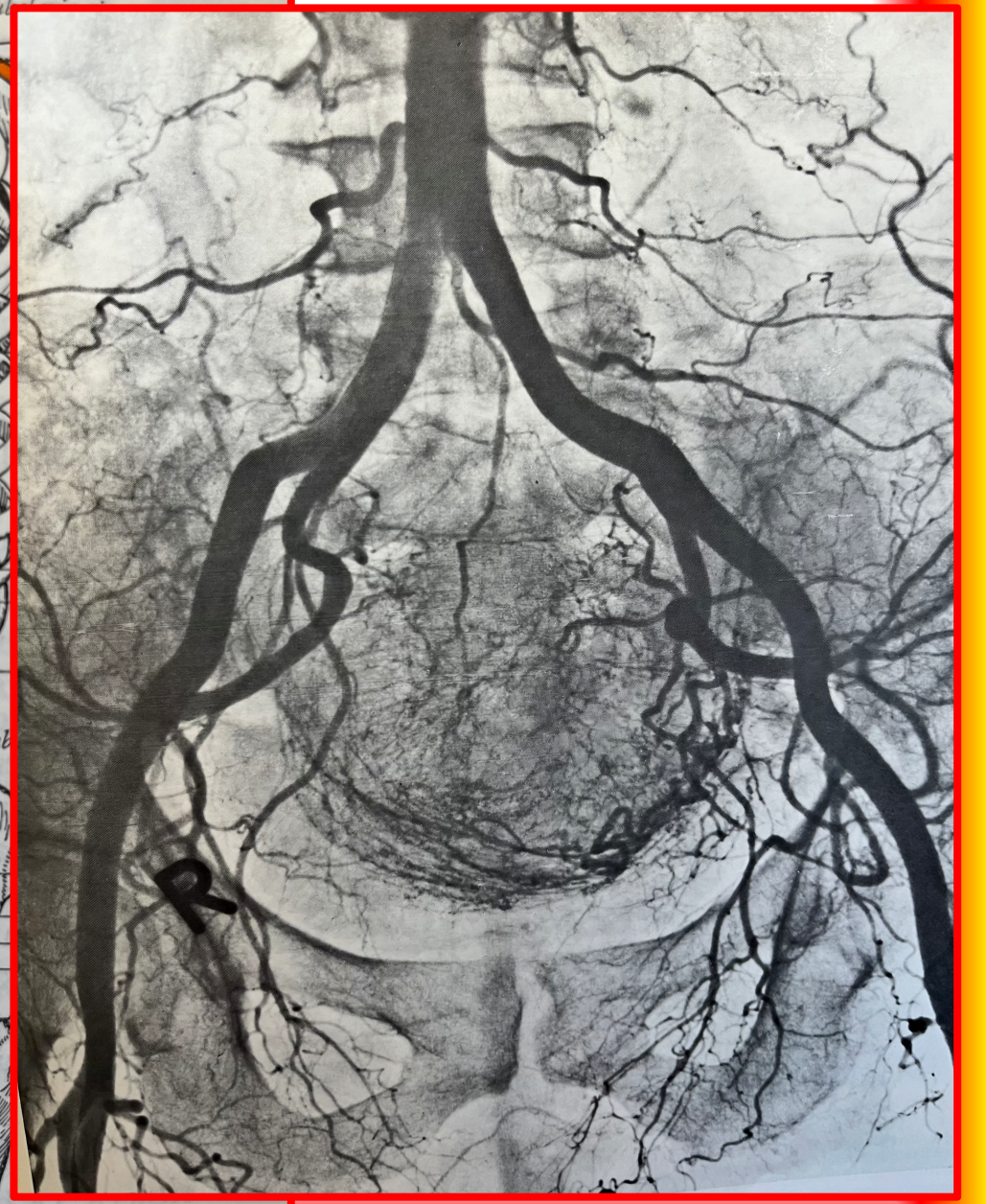
- Aortakompression
- Alt bimanuell uterus kompression
- Tillkalla personal
- Sänk huvudända och syrgas 5-10 L/min
- Blodtryck och puls
- 2 grova nålar
- Hb, bastest, hemostasprover, blodgas
- Varma vätskor
  - Ringeracetat (försiktighet > 2000 ml)
  - Risk spädningskoagulopati
- KAD
- Håll patient varm
- Inj Tranexamsyra (Cyklokapron®) 1-2 g iv



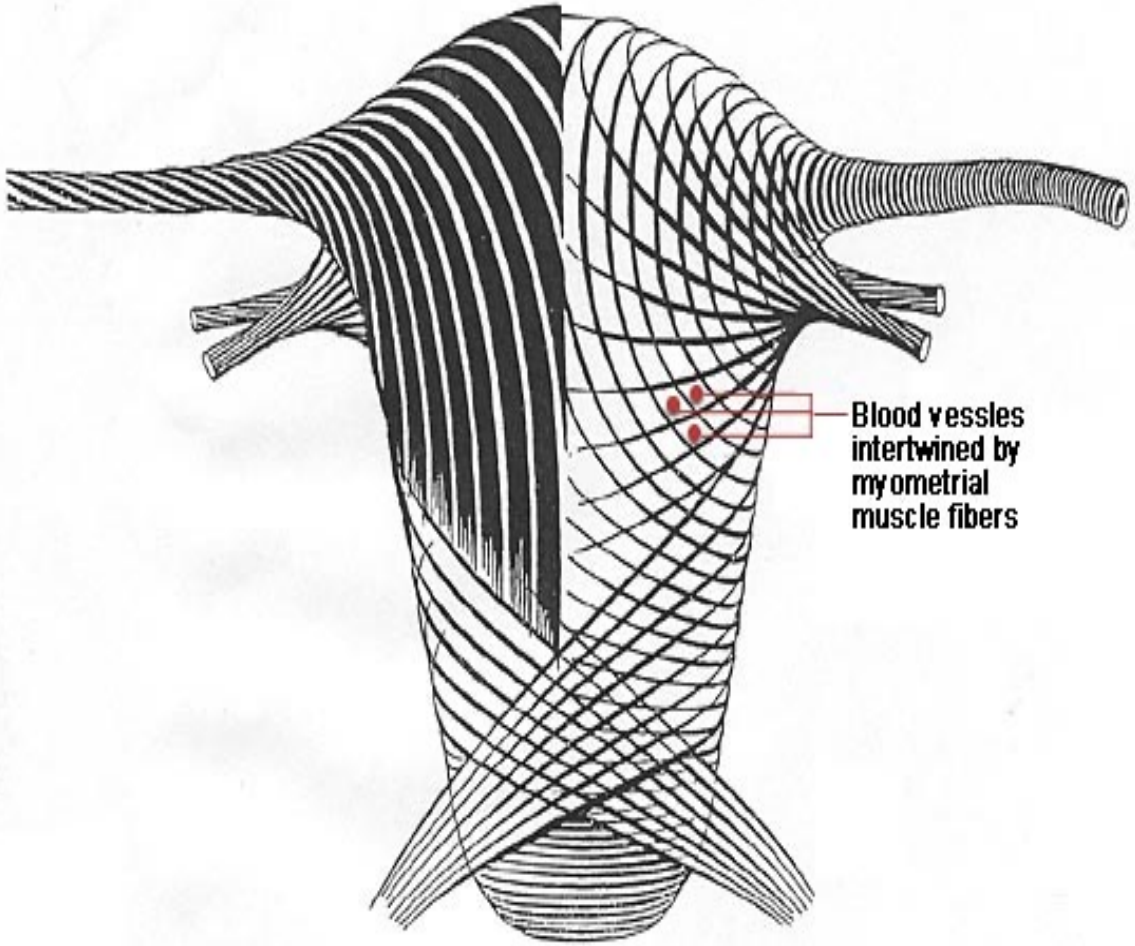
FIGUR 39 - Aortakompression sker lättast i höjd med naveln, som på bukens yta motsvarar projektionen av nedersta delen av bukaorta innan bifurkationen. Ena handen palperar först ljumskens puls. Den knutna andra handen, mjukt och försiktigt anlagd mot naveln, sänks sakta tills aortapulsationerna förnimmes.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


colon sigmoid
rectum


A. carotis communis dext.
A. subclavia dext.
A. carotis communis sin.
Umbilicus
Aorta ab


R

Farmakologisk behandling av atoni



- Inj Oxytocin (Syntocinon®)
  - Bolus 8,3 ug/ml 1 ml iv under 1 min
  - Oxytocin 8,3 ug/ml = 5 E/ml
  - Vid elektivt snitt under 5 minuter
  - Infusion 66,4 ug/500 ml NaCl, 120 ml/t
- Inj Metylergometrin (Methergin®)
  - 0,2 mg iv alt im, långsamt
  - Kan upprepas 4 ggr
- Inj Karboprost (Prostinfenem®)
  - 0,25 mg im
  - Kan upprepas 8 ggr
- T Misoprostol (Cytotec®)
  - 0,2 mg 3 st rektalt

Oxytocin (Syntocinon®)

- Effekt
  - Stimulerar värkarbete
  - Uterussammandragande
- Farmakokinetik
  - t ½ 3-20 min
- Biverkningar
  - ADH effekt
  - **Takykardi och arytmi**
  - **Hjärtischemi**

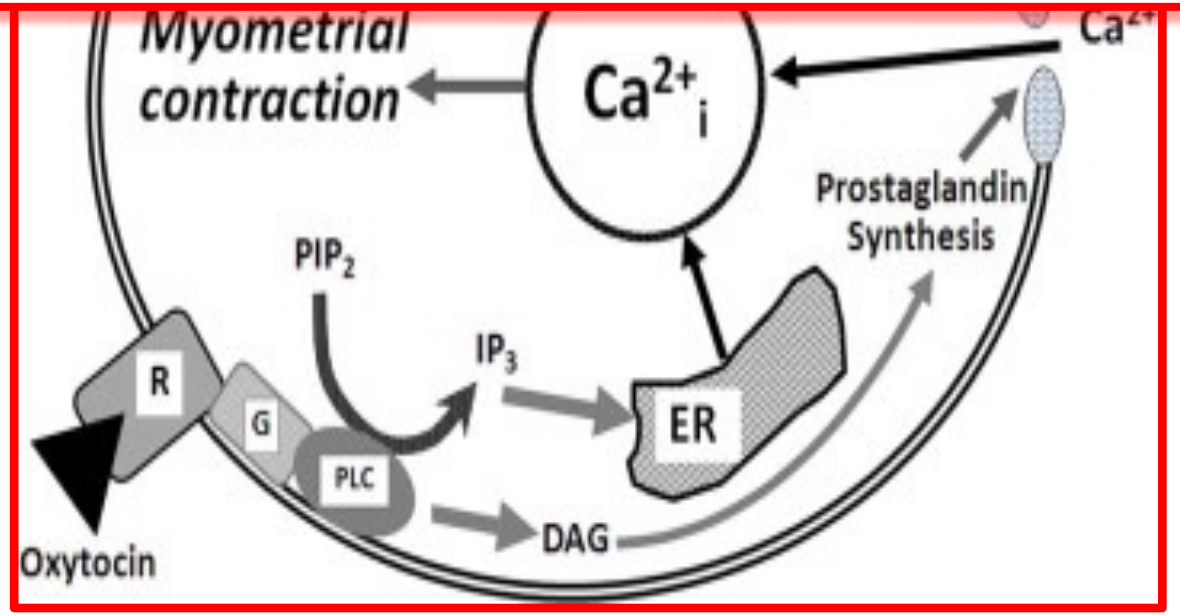
British Journal of Anaesthesia **100 (5):** 683–9 (2008)
doi:10.1093/bja/aen071 Advance Access publication April 2, 2008

BJA

OBSTETRICS

Signs of myocardial ischaemia after injection of oxytocin: a randomized double-blind comparison of oxytocin and methylergometrine during Caesarean section

M. C. Svanström[1], B. Biber[3], M. Hanes[3], G. Johansson[3], U. Näslund[2] and E. M. Bålfors[4]*



Oxytocin Requirements at Elective Cesarean Delivery: A Dose-Finding Study

Obstet Gynecol 2004;104:1005-10

José C. A. Carvalho, MD, PhD, Mrinalini Balki, MD, John Kingdom, MD, and Rory Windrim, MD

OBJECTIVE: Oxytocin is frequently used by intravenous bolus and infusion to minimize blood loss and prevent postpartum hemorrhage at cesarean delivery. Current dosing regimens are arbitrary whereas large doses may pose a serious risk to the mother. The purpose of this study was to estimate the minimum effective intravenous bolus dose of oxytocin (ED_{90}) required for adequate uterine contraction at elective cesarean in nonlaboring women.

METHODS: A randomized, single-blinded study was undertaken in 40 healthy term pregnant women presenting for elective cesarean under spinal anesthesia. Oxytocin was administered by bolus according to a biased coin up-and-

Effektiv (ED90) dos vid elektiva snitt?

1. 5 enheter 8,3 ug
2. 2 enheter 3,3 ug
3. 1 enhet 1,66 ug
4. 0,35 enheter 0.6 ug

ical.[3–6] Furthermore, the minimum effective dose of oxytocin at cesarean delivery has not yet been established. The purpose of our study was therefore to esti-

Elektivt snitt 0.35 E (ca 0,6 µg)

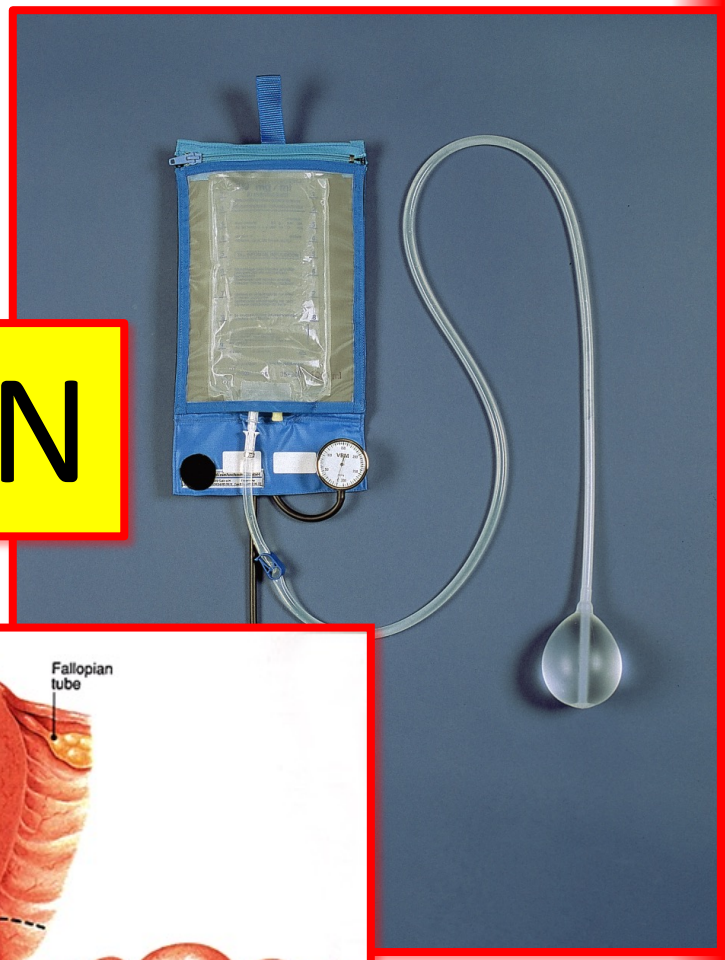
Akutsnitt 3.0 E (ca 5,0 µg)

Oxytocin 1 E/ml (1,66 µg/ml)

Metylergometrin (Methergin®)

- Effekt
  - Uterussammandragande
- Farmakokinetik
  - t ½ 0,5-2t
  - Effekt 30-60 sek och duration 4-6 timmar
- Biverkningar
  - Hypertoni
  - Illamående och kräkningar
  - Hjärtischemi
- Försiktighet
  - Preeklampsi

Obstetriska åtgärder



STOPPA BLÖDNINGEN

- Kontroll placenta
- Exploration uterus
- Kontroll cervix och vagina
- Ballongtamponad
- Kompressionssutur, B-Lynch
- Hysterektomi

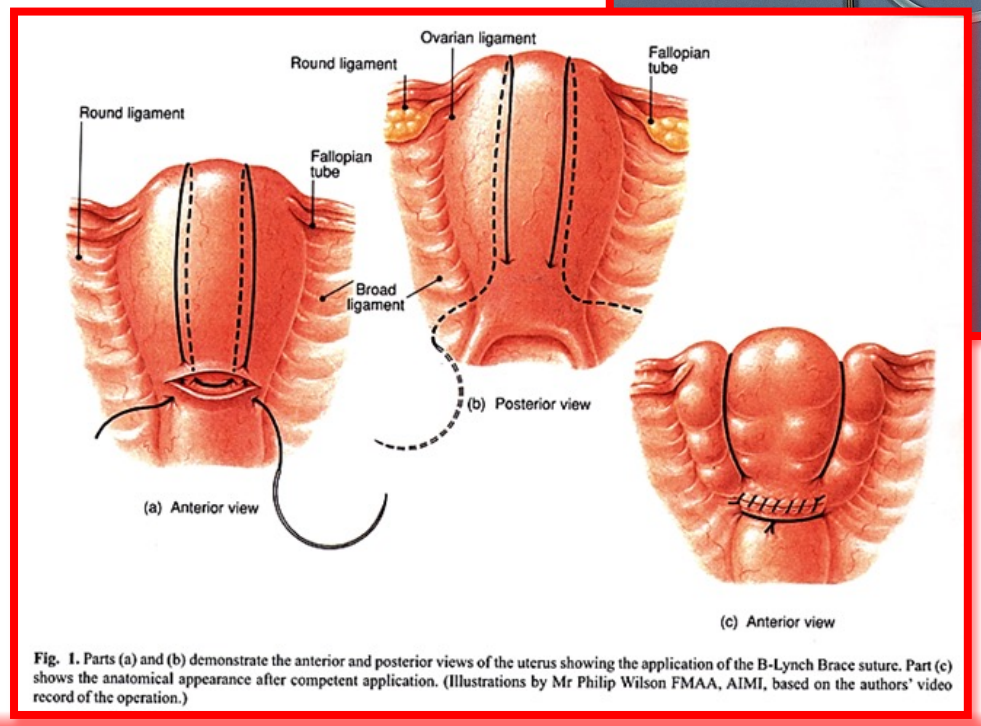


Fig. 1. Parts (a) and (b) demonstrate the anterior and posterior views of the uterus showing the application of the B-Lynch Brace suture. Part (c) shows the anatomical appearance after competent application. (Illustrations by Mr Philip Wilson FMAA, AIMI, based on the authors' video record of the operation.)

Hemostas

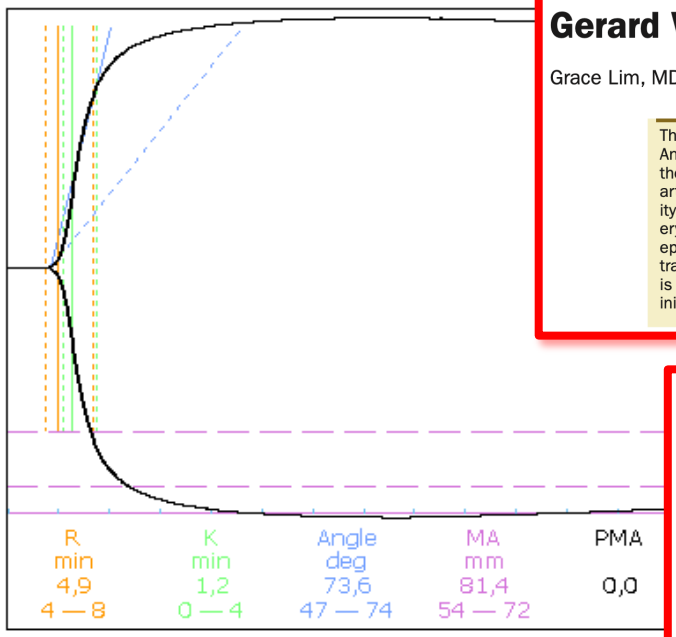
Prospective Longitudinal Study of Thromboelastography and Standard Hemostatic Laboratory Tests in Healthy Women During Normal Pregnancy

Ove Karlsson, MD,* Tommy Sporrong, MD, PhD,† Andreas Hillarp, PhD,‡ Anders Jeppsson, MD, PhD,‖¶ and Margareta Hellgren, MD, PhD†#

BACKGROUND: Hemostatic disorders are common in obstetric co
raphy (TEG®) simultaneously measures coagulation and fibrinolysis
primary aim in this prospective longitudinal study was to obtain k
changes in TEG® variables during normal pregnancy and 8 weeks
aims were to compare TEG® variables during pregnancy with TEG® v
and gestational weeks 10 to 15 and to correlate TEG® variables to
METHODS: Blood samples were collected from 45 healthy pregnan
10 to 15, 20 to 22, 28 to 30, and 38 to 40, and at 8 weeks pos
analyses were performed: time until start of clotting (TEG®-R), tir
(TEG®-K), angle of clotting (TEG®-Angle), maximum amplitude (T
minutes (TEG®-LY30). Activated partial thromboplastin time, prot
antithrombin, D-dimer, and platelet count were analyzed.
RESULTS: Compared to 8 weeks postpartum TEG®-R was at leas
limit 99% confidence intervals) until gestational weeks 28 to 30 a
between 23%–26%. TEG®-K was at least 0.1 minutes shorter th

Haemostasis during pregnancy

- Factors ↗
  - Fibrinogen
  - Factors VII, VIII, X, XII
  - vWF
- Factors ↘
  - Factor XI
  - Factor XIII
  - Protein S
- Factors →
  - Protein C
  - Antitrombin ev ↘
- Fibrinolysis ↘
  - Plasminogen ↗
  - PAI-1 ↗↗
  - PAI-2 ↗↗



A key komponent PPH, point of care

Anesthesia & Analgesia

SPECIAL ARTICLE

What Is New in Obstetric Anesthesia: The 2021 Gerard W. Ostheimer Lecture

Grace Lim, MD, MSc*†

The Gerard W. Ostheimer lecture is given annually to members of the Society for Obstetric Anesthesia and Perinatology. This lecture summarizes new and emerging literature that informs the clinical practice of obstetric anesthesiologists. In this review, some of the most influential articles discussed in the 2021 virtual lecture are highlighted. Themes include maternal mortality; disparities and social determinants of health; cognitive function, mental health, and recovery; quality and safety; operations, value, and economics; clinical controversies and dogmas; epidemics and pandemics; fetal-neonatal and child health; general clinical care; basic and translational science; and the future of peripartum anesthetic care. Practice-changing evidence is presented and evaluated. A priority list for clinical updates, systems, and quality improvement initiatives is presented. (Anesth Analg 2022;00:00–00)

Experience of Point-of-Care Devices in Obstetrical Care

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Semin Thromb Hemost 2017;43:397–406.

Abstract

During pregnancy and puerperium, there are pronounced hemostatic changes characterized by increased coagulability and decreased fibrinolysis. In addition, hemostasis can change dramatically during obstetric complications. Several reports have described substandard management of hemostatic defects in this setting and state the need for guidelines and better care. Point-of-care devices can assess hemostatic status and are especially suitable in perioperative settings. Using point-of-care devices, no time is required for transportation, allowing faster availability of results and providing potential for better care of the patient. This article will demonstrate the use of a viscoelastic method in six different patients; five with impaired hemostasis, and where the use of viscoelastic method contributes or should have contributed to better care. The cases represent patients with normal delivery; postpartum hemorrhage (PPH); PPH with low fibrinogen; placental abruption; preeclampsia with hemolysis, elevated liver enzymes, low platelet count syndrome; and finally, one patient with sepsis. This article also shows the need for good practices and good supervision to implement the devices in patient care.

Keywords
- obstetric
- point-of-care
- viscoelastic method
- thromboelastography
- thromboelastometry
- hemostatic complication
- postpartum hemorrhage
- DIC
- fibrinogen

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 Schlir

BACKGROUND Ma
complex and involves
gies to ensure optima
morbidity and mortal
European Society o
(ESAIC) aim to prov
mendations for hea
improved clinical ma

DESIGN A systemat
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 for
methodology was
guideline.

RESULTS These se
articles were assess
were revised to inco
mendations derived from the systematic literature search, and four clinical guidances retained from previous ESAIC guidelines were formulated. Using the Delphi process on

to the many important aspects in peri-operative non-trauma bleeding management, guidance as to how best approach and treat each individual patient are key. Understanding which therapeutic approaches are most valuable at each

that are available to them. These guidelines aim to provide specific guidance for bleeding management in a variety of clinical situations.

VHA can identify obstetric coagulopathy including hypofibrinogenaemia and reduced platelet level. B

VHA-guided haemostatic treatment reduces the need for blood products. B

In severe postpartum haemorrhage, we suggest a VHA-guided intervention protocol. 2C

2.6 Patients undergoing obstetric surgery

Recommendation 12
We recommend that postpartum haemorrhage should be managed by a multidisciplinary team. 1C

We recommended the use of an escalating postpartum haemorrhage management protocol including uterotonic drugs, surgical and/or endovascular interventions and procoagulant drugs. 1B

Risk awareness and early recognition of severe postpartum haemorrhage are essential. C

We suggest that patients with known placenta accreta spectrum disorders be treated by multidisciplinary care

tion of PBM programmes in

t RBC treatment (single unit
units in haemodynamic stable

ated in obstetric settings, pro-
are taken against rhesus

i-operative cell salvage during caesarean section with high risk of haemorrhage may decrease homologous transfusion. 2B

We recommend i.v. iron supplementation as this elicits a
mia with fewer gastrointestinal
treatment. 1B

Intravenous iron supplementation improves fatigue and depression score postpartum. B

We suggest assessing fibrinogen levels in parturients with bleeding, as levels less than 2 g l^{-1} may identify those at risk of severe postpartum haemorrhage. 1C

Coagulopathy risk assessment should include the obstetrical conditions associated with PPH not just an estimat-

uscitation with crystalloids and colloids
h coagulopathy and adverse maternal
hen with postpartum haemorrhage. C

t count decrease or a level less than
he onset of labour, particularly if com-
a fibrinogen level less than 2.0 g l^{-1}, may
ased risk of postpartum haemorrhage. C

of labour, aPTT and PT are of little
for postpartum haemorrhage. C

obstetric coagulopathy including hypo-
and reduced platelet level. B

mostatic treatment reduces the need for
B

against pre-emptive fibrinogen replace-
in ongoing postpartum haemorrhage
genaemia, we recommend fibrinogen

itution in women with ongoing postpar-
e and a fibrinogen level above 2 g l^{-1} or
ater than 12 mm is not indicated. 1B

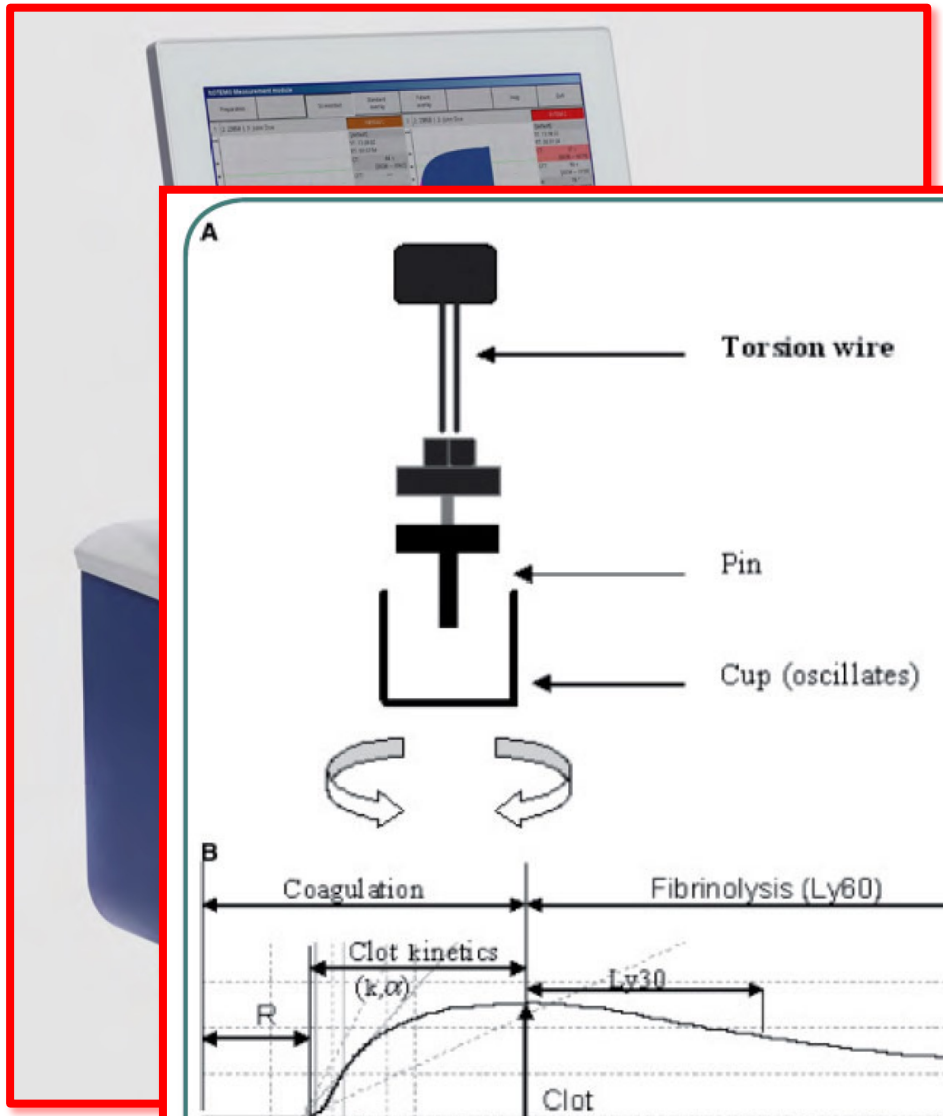
rtum haemorrhage, we suggest a VHA-
ion protocol. 2C

he administration of TXA in postpartum
a dose of 1 g intravenously as soon as
h, which can be repeated if bleeding

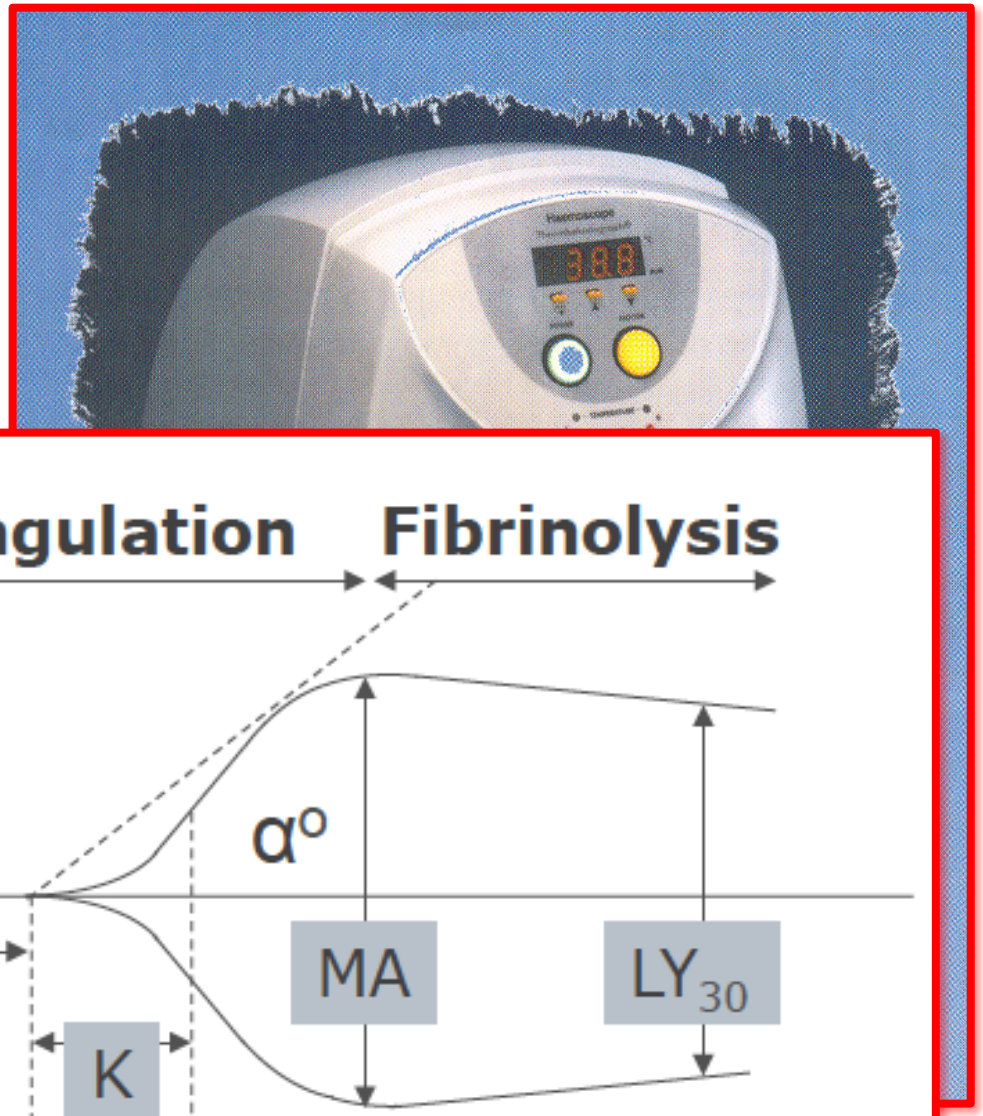
TXA be considered before high-risk
and vaginal deliveries or cases of ante-
2B

administration of rFVIIa can be consid-
tening postpartum haemorrhage, which cannot be stopped by conventional, surgical or interventional radiological means and/or when comprehensive coagulation therapy fails. 2C

We recommend against a prophylactic/general use of rFVIIa in postpartum haemorrhage because of increased risk of fatal thrombosis. 1C



A
Torsion wire
Pin
Cup (oscillates)
B
Coagulation
Fibrinolysis (Ly60)
Clot kinetics
(k,α)
Ly30
R
Clot
strength
(MA)



Coagulation
Fibrinolysis
αº
R
K
MA
LY30

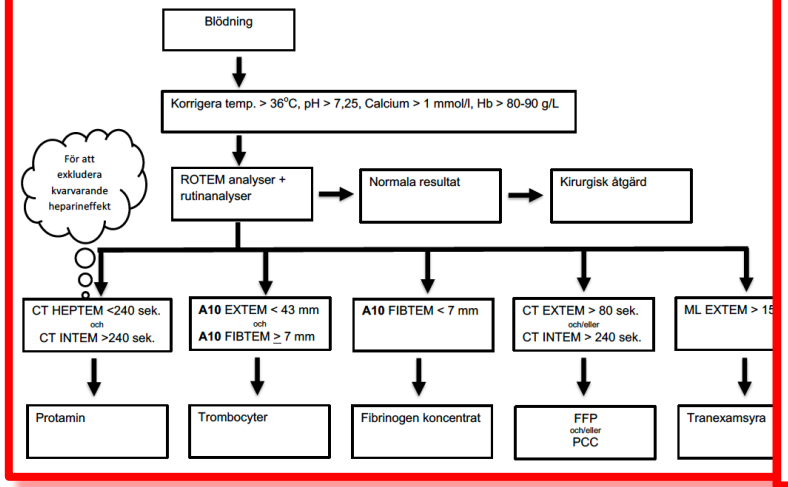
Lathund för översättning av A5, A10 & MCF till fibrinogenkoncentration i g/L

Analys: Fib-TEM

A5	A10	MCF	**Ungefärlig** koncen
3 mm	4 mm	5 mm	1 g
5 mm	8 mm	10 mm	2 g
13 mm	15 mm	17 mm	3 g
20 mm	23 mm	25 mm	4 g

Referens: bl.a. korrelationsstudie från instrumenttillver
"Correlations Fib-TEM using Fib-TEM reagent vs Clau
or platelets", 2006 08 01

ROTEM algoritm (modifierad, huvudsakligen baserad på publikation från Bolliger/Tanaka & Skinner)



British Journal of Anaesthesia **112** (5): 852–9 (2014)
Advance Access publication 31 January 2014 · doi:10.1093/bja/aet480

BJA

Peri-partum reference ranges for ROTEM® thromboelastometry

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

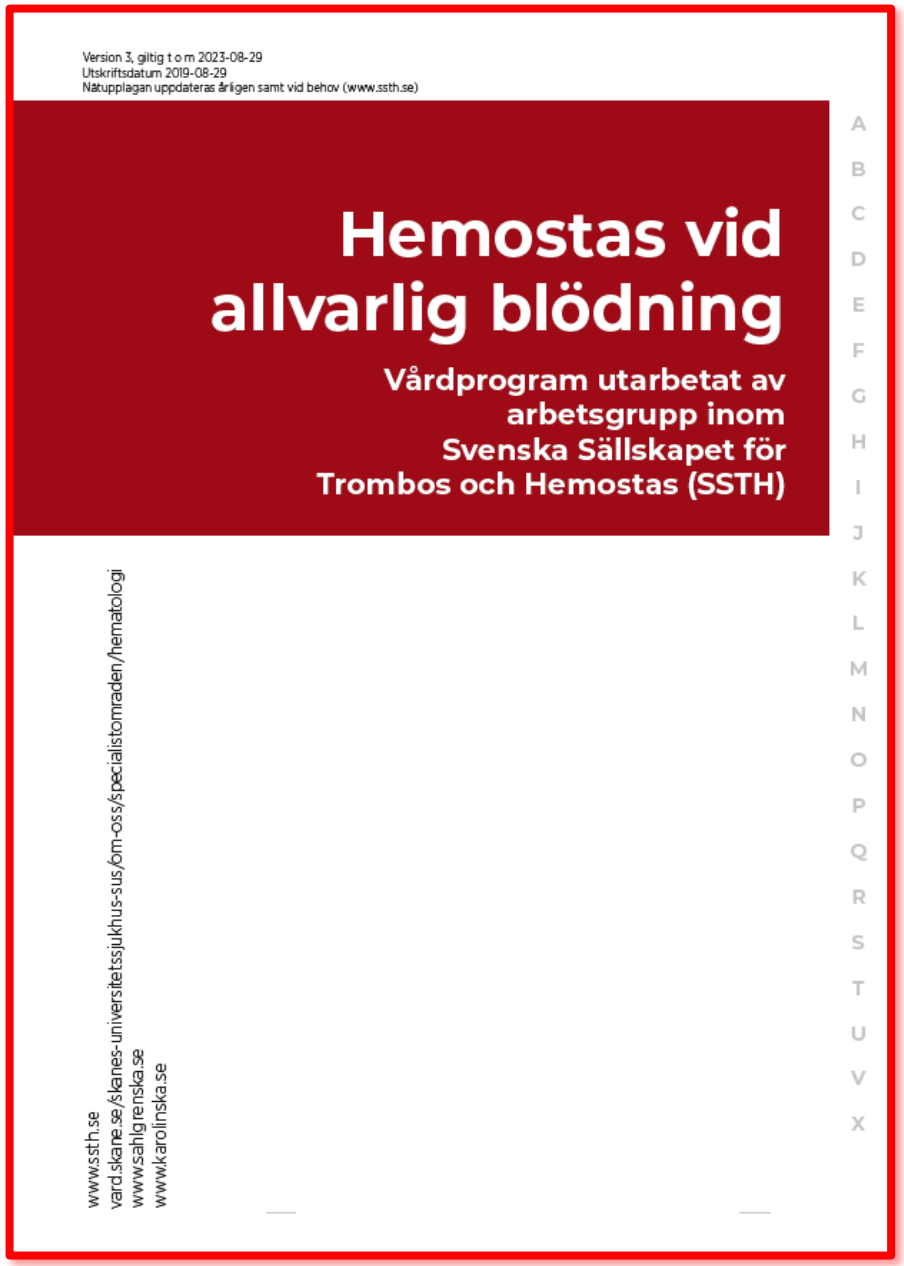
Misstanke om heparineffekt

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

Mål under pågående blödning:

- Hb > 90 g/l
- TPK > 100 x 10^9/l
- PK < 1,5
- APTT normal
- Fibrinogen > 2,0-2,5 g/l
- Temp > 36,5 ° C
- pH > 7,2
- Jonicerat Ca >1,0
- **Patient nära analysinstrument**
- **Upprepa provtagning!**



Tranexamsyra

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Tranexamic Acid for the Prevention of Loss after Cesarean Delivery

L. Sentilhes, M.V. Sénat, M. Le Lous, N. Winer, P. Rozenberg, E. Verspyck, F. Fuchs, E. Azria, D. Gallot, D. Korb, R. Desbrière, C. Chauleur, F. de Marcillac, F. Perrotin, O. Parant, L.J. Salomon, 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

...with reduced ...out 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

BJA

British Journal of Anaesthesia, 129 (6): 937–945 (2022)

doi: 10.1016/j.bja.2022.08.033

Advance Access Publication Date: 13 October 2022

Obstetric Anaesthesia

OBSTETRIC ANAESTHESIA

Tranexamic acid dose–response ... postpartum haemorrhage during Caesarean delivery: TRACES, a double-blind, placebo-controlled, multicentre, dose-ranging biomarker study

Anne-Sophie Ducloy-Bouthors[1,2,*], Sixtine Gilliot[2], Ma... Alexandre Turbelin[1], Hawa Keita-Meyer[6], Agnès Rigo... Benjamin Constant[9], Francoise Broisin[10], Agnès L. Go... Louise Ghesquiere[14], Gilles Lebuffe[2,15], Alain Duhame... Benjamin Hennart[16], Emmanuelle Jeanpierre[17], Pasca...

- Randomiserad blindad: placebo / 0,5 g / 1 g
- Skillnad i fibrinolys, laboratorietetest
- Blödningsmängd inom 6t: 208 / 300 / 134 ml

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

WOMAN Trial Collaborators*

Summary

Background Post-partum haemorrhage is the leading cause of maternal death worldwide. Early administration of tranexamic acid reduces deaths due to bleeding in trauma patients. We aimed to assess the effects of early administration of tranexamic acid on death, hysterectomy, and other relevant outcomes in women with post-partum haemorrhage.

Methods In this randomised, double-blind, placebo-controlled trial, we recruited women aged 16 years and older with a clinical diagnosis of post-partum haemorrhage after a vaginal birth or caesarean section from 193 hospitals in 21 countries. We randomly assigned women to receive either 1 g intravenous tranexamic acid or matching placebo in addition to usual care. If bleeding continued after 30 min, or stopped and restarted within 24 h of the first dose, a second dose of 1 g of tranexamic acid or placebo could be given. Patients were assigned by selection of a numbered treatment pack from a box containing eight numbered packs that were identical apart from the pack number. Participants, care givers, and those assessing outcomes were masked to allocation. We originally planned to enrol 15 000 women with a composite primary endpoint of death from all-causes or hysterectomy within 42 days of giving birth. However, during the trial it became apparent that the decision to conduct a hysterectomy was often made at the same time as randomisation. Although tranexamic acid could influence the risk of death in these cases, it could not affect the risk of hysterectomy. We therefore increased the sample size from 15 000 to 20 000 women in order to estimate the effect of tranexamic acid on the risk of death from post-partum haemorrhage. All analyses were done on an intention-to-treat basis. This trial is registered with ISRCTN76912190 (Dec 8, 2008); ClinicalTrials.gov, number NCT00872469; and PACTR201007000192283.

Lancet 2017; 389: 2105–16

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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

*Collaborators listed at end of the report

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...ed and randomly assigned to receive ...spectively, were included in the analysis. ...acid (155 [1·5%] of 10 036 patients *vs* 191 ...); p=0·045), especially in women given ...up *vs* 127 [1·7%] in the placebo group, ...er significantly by group. Hysterectomy ...acid group *vs* 351 [3·5%] in the placebo ...of death from all causes or hysterectomy ...the tranexamic acid group *vs* 546 [5·5%] ...(including thromboembolic events) did

...ith post-partum haemorrhage with no ...examic acid should be given as soon as

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

Tranexamsyra

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 A
Giedrius Barauskas, Edoardo De Rob
Anne Godier, Thorsten Haas, Matthias
Zsolt Molnar, Lidia Mora, Niels Rahe-M
Christoph Schlimp, Anne J. Wikkelsø a

BACKGROUND Management of peri-operative bl
complex and involves multiple assessment tools a
gies to ensure optimal patient care with the goal of
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

DISCUSSION Peri-operative bleeding management encompasses the patient's journey from the pre-operative state through the postoperative period. Along this journey, many features of the patient's pre-operative coagulation status, underlying comorbidities, general health and the procedures that they are undergoing need to be taken into account. Due to the many important aspects in peri-operative nontrauma bleeding management, guidance as to how best approach and treat each individual patient are key. Understanding which therapeutic approaches are most valuable at each timepoint can only enhance patient care, ensuring the best outcomes by reducing blood loss and, therefore, overall morbidity and mortality.

CONCLUSION All healthcare professionals involved in the management of patients at risk for surgical bleeding should be aware of the current therapeutic options and approaches that are available to them. These guidelines aim to provide specific guidance for bleeding management in a variety of clinical situations.

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

Received: 12 March 2023 | Revised: 15 August 2023 | Accepted: 2 October 2023

https://doi.org/10.1016/j.jtha.2023.10.001

jth

REVIEW ARTICLE

When to use tranexamic acid for the treatment of major bleeding?

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Abstract

Tranexamic acid (TXA) is an antifibrinolytic agent originally developed for the management of bleeding in the setting of postpartum hemorrhage (PPH). Over the last 15 years, there has been accumulating evidence on the use of TXA for the treatment of active bleeding in a variety of clinical contexts. Clinical trials have shown that the efficacy and safety of TXA for the treatment of bleeding differ according to the clinical context in which it is being administered, timing of administration, and dose. Early administration is important for efficacy, particularly in trauma and PPH. Further studies are needed to understand the mechanisms by which TXA provides benefit, optimal modes of administration and dosing, and its effect in some clinical settings, such as spontaneous intracerebral hemorrhage. There is no evidence that TXA increases the risk of thrombotic events in patients with major bleeding overall. However, there is evidence of increased risk of venous thrombosis in patients with gastrointestinal bleeding. There is also evidence of increased risk of seizures with the use of higher doses. This review summarizes the current evidence for the use of TXA for patients with active bleeding and highlights the importance of generating evidence of efficacy
c to the bleeding contexts—as findings
le to other contexts—and that of indi-
tic, and other risks, as well as important
o optimize care and outcomes in these

- Viss effekt på mortalitet vid trauma och PPH
- Tidig administrering bättre
- Ingen ökad risk trombotiska komplikationer

KEYWORDS
fibrinolysis, major hemorrhage, thrombosis, tranexamic acid, transfusion

Blodtransfusion

Bedöm om blödning kommer att:

Blödning < ½ blodvolym och blödning avstannar

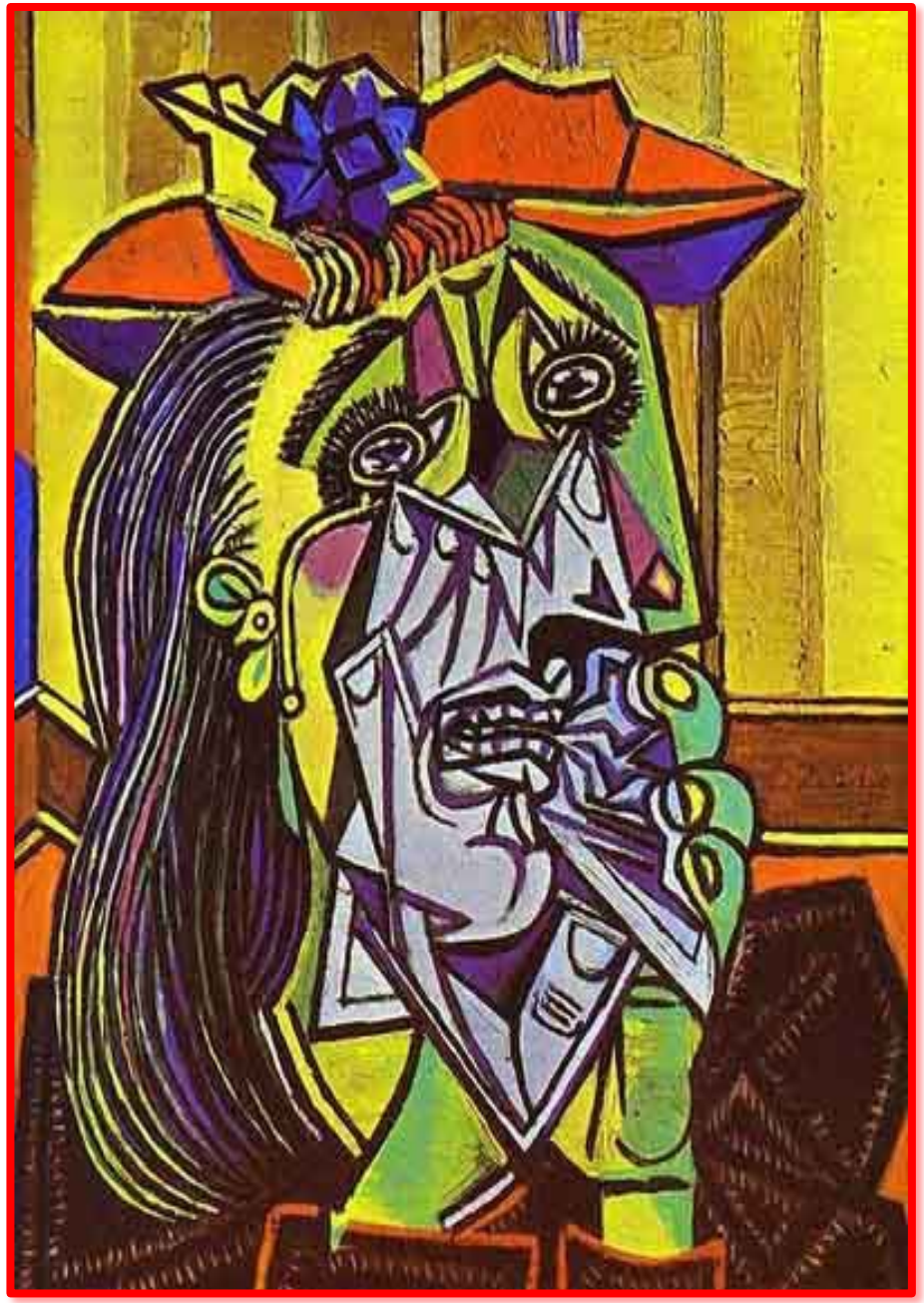
- Transfundera
  - Så lite som möjligt
  - Målriktad terapi
  - Kristalloid

Blödning > ½ blodvolym och blödning pågår

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

Transfusions risker

- Infektioner
  - Virus
  - Bakteriell kontamination
  - Okända patogener
- Immunologiska reaktioner
  - ABO inkompatibel
  - Haemolytisk transfusions reaktion
  - Anafylaxi
  - TRALI,
    transfusion related acute lung injury



ORIGINAL ARTICLE

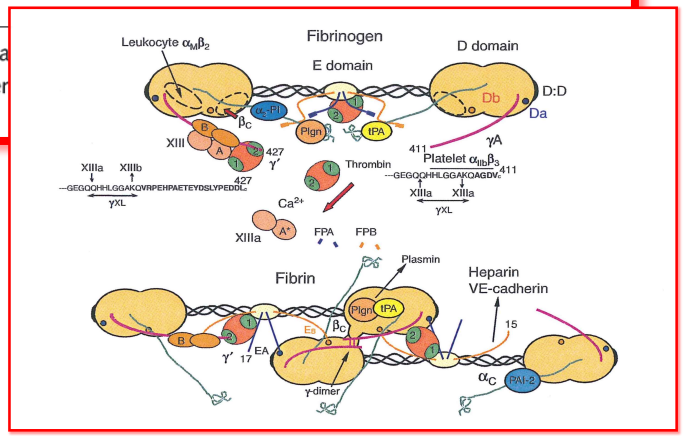
The decrease of fibrinogen is an early predictor of the severity of postpartum hemorrhage

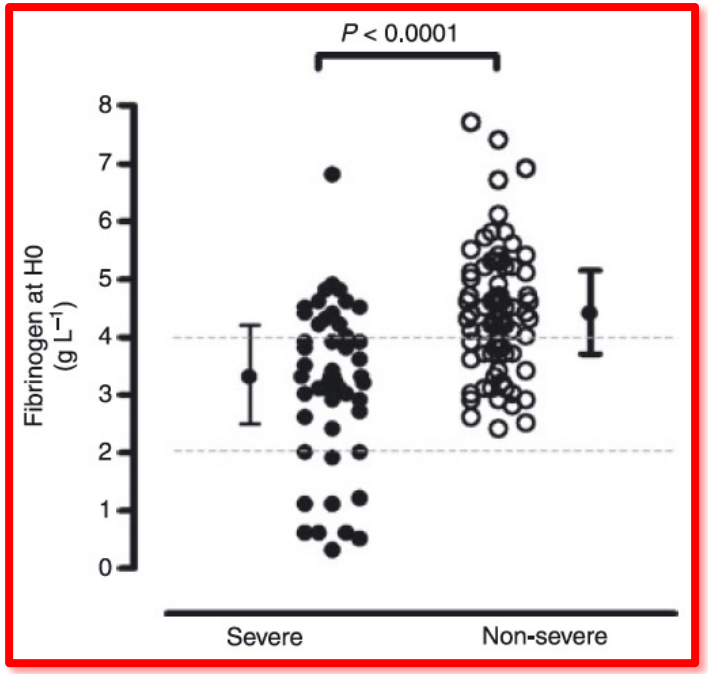
B. CHARBIT,*† L. MANDELBROT,‡ E. SAMAIN,§ G. BARON,¶ B. HADDAOUI,‡‡‡ H. KEITA,‡¶ O. SIBONY,** D. MAHIEU-CAPUTO,¶ M. F. HURTAUD-ROUX,** M. G. HUISSE,¶‡‡ M. H. DENNINGER,†‡‡ and D. DE PROST‡†††‡‡ FOR THE PPH STUDY GROUP

*AP-HP, Hôpital Saint-Antoine, Clinical Investigation Center, Paris; †AP-HP, Hôpital Beaujon, Clichy; ‡AP-HP, Hôpital Louis Mourier, Colombes; §Hôpital Jean Minjoz, Besançon; ¶AP-HP, Hôpital Bichat, Paris; **AP-HP, Hôpital Robert Debré, Paris; ††INSERM U698, Paris; and ‡‡AP-HP, CIB PhenoGen, Paris, France

To cite this article: Charbit B, Mandelbrot L, Samain E, Baron G, Haddaoui B, Keita Denninger MH, de Prost D, for the PPH Study Group. The decrease of fibrinoger *J Thromb Haemost* 2007; **5**: 266–73.

Summary. *Background:* Postpartum hemorrhage (PPH) is a major source of maternal morbidity. *Objectives*: This study's objective was to determine whether changes in hemostasis markers during the course of PPH are predictive of its severity. *Patients and methods:* We enrolled 128 women with PPH requiring uterotonic prostaglandin E2 (sulprostone) infusion. Two groups were defined (severe and non-severe PPH) according to the outcome during the first 24 hours. According to our criteria, 50 of the 128 women had severe PPH. Serial coagulation tests were performed at enrollment (H0), and 1, 2, 4 and 24 hours thereafter. *Results:* At H0, and through H4, women with severe PPH had significantly lower fibrinogen, factor V, antithrombin activity, protein C antigen, prolonged prothrombin time, and higher D-dimer and TAT complexes than women with non-severe PPH. In multivariate analysis, from H0 to H4, fibrinogen was the only marker associated with the occurence of severe PPH. At H0, the risk for severe PPH was 2.63-fold higher for each 1 gL^{-1} decrease of fibrinogen. The negative predictive value of a fibrinogen concentration >4 gL^{-1} was 79% and the positive predictive value of a concentration ≤ 2 gL^{-1} was 100%. *Conclusion:* These findings indicate that a simple fibrinogen measurement can anticipate severe bleeding in PPH.





- Risken för allvarlig PPH var 2.63-fold högre för varje 1 g/L sänkning fibrinogen
- Positivt prediktions värde för fibrinogen ≤2 g/L var 100%
- Ett enkelt fibrinogen prov kan predicera risken för allvarlig PPH.

Fibrinogen

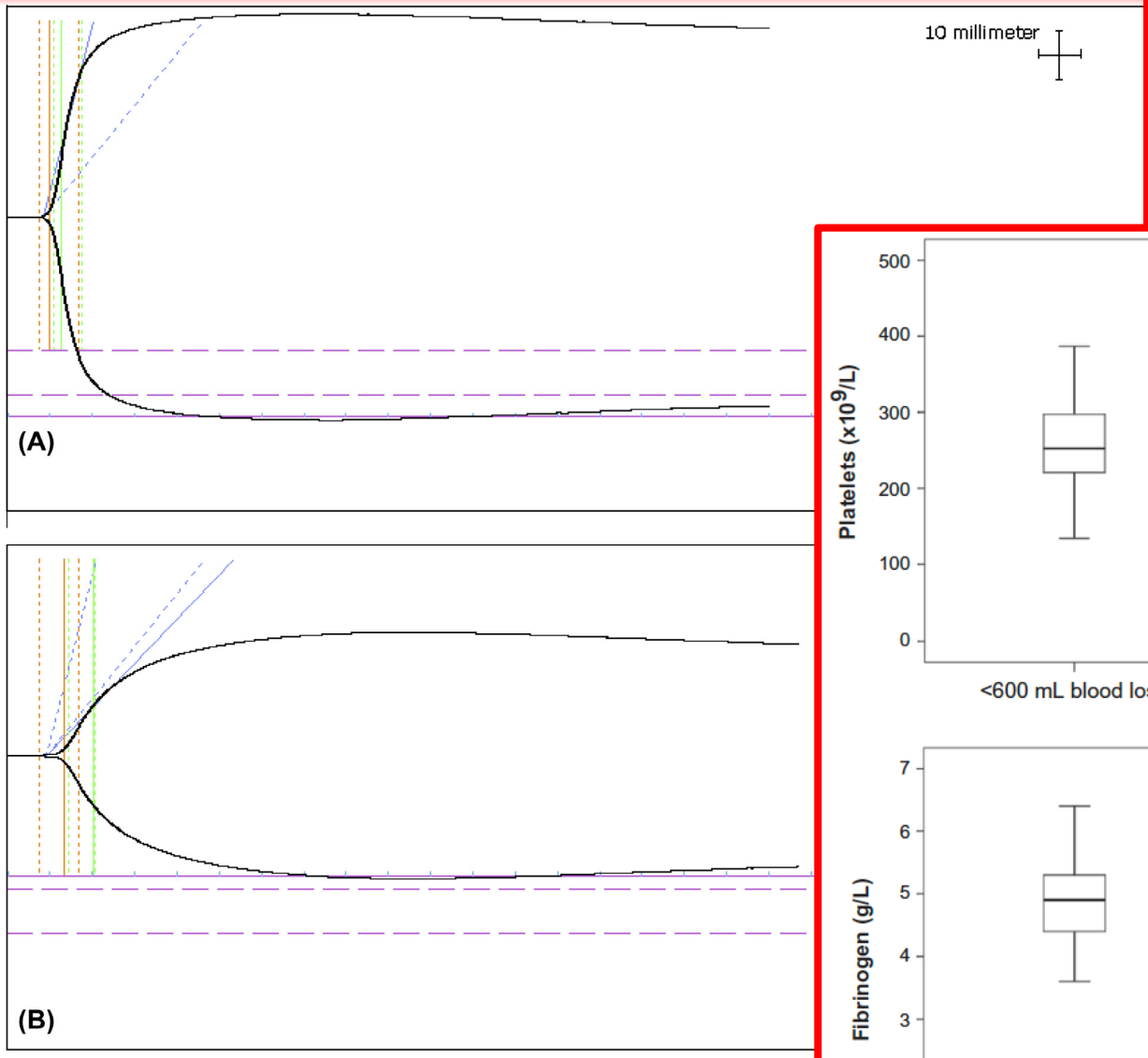


Fig. 1 Two thromboelastographic profiles. (A) TEG profile in a woman with normal ble
250 mL, TEG-R 4.9 min, TEG-MA 81.4 mm, Platelets 239 × 10^9/L, Fibrinogen 6.0 g/L a
profile in a woman with major obstetric haemorrhage. Estimated blood loss 2500 ml,
Platelets 55 × 10^9/L, Fibrinogen 1.7 g/L, Antithrombin 0.37 kIU/L.

International Journal of Obstetric Anesthesia (2014) 23, 10–17
0959-289X/$ - see front matter
http://dx.doi.org/10.1016/j.ijoa.2013.07.003

ORIGINAL ARTICLE

ELSEVIER
www.obstetanesthesia.com

Major obstetric haemorrhage: monitoring with thromboelastography, laboratory analyses or both?

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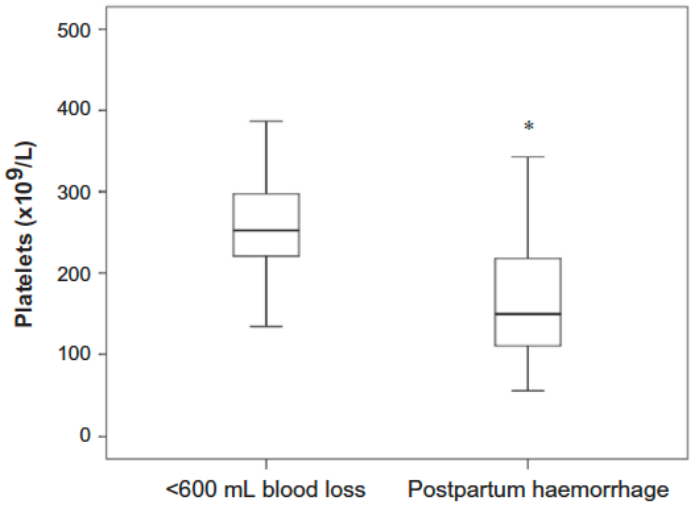
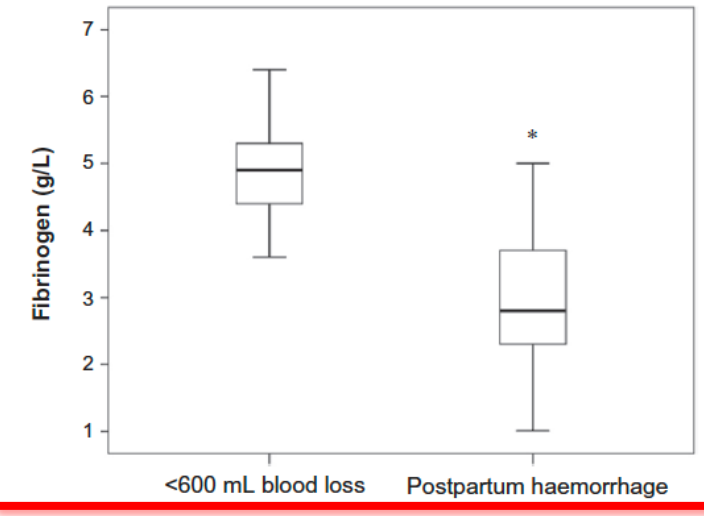
grenska University Hospital, Gothenburg, Sweden
y and Anaesthesia, Sahlgrenska University Hospital and
Medicine, University of Gothenburg, Gothenburg, Sweden
a University Hospital, Gothenburg and Department of Prenatal Care,

ause of morbidity and mortality in the obstetric population. The aim of this study was
and laboratory analyses to evaluate haemostasis during major obstetric haemorrhage.
ions between the results of thromboelastography, laboratory analyses and estimated

stetric haemorrhage and 49 women with blood loss <600 mL were included. The fol-
performed: time to start of clotting (TEG-R), time to 20 mm of clot firmness (TEG-K),
amplitude of clot (TEG-MA) and lysis after 30 min (TEG-LY30). In addition, platelet
e, prothrombin time, fibrinogen, antithrombin and D-dimer were measured.
flecting clot stability and fibrinolysis were decreased in women with massive obstetric
rmal bleeding, while clot initiation was accelerated. Laboratory analyses also showed
nced differences in platelet count, fibrinogen concentration and antithrombin activity.
fibrinogen and TEG-MA and between estimated blood loss and TEG-MA, fibrinogen

strated by thromboelastography and laboratory analyses, was found after an estimated
hy provides faster results than standard laboratory testing which is advantageous in the
However, laboratory analyses found greater differences in coagulation variables, which





- Snabbare initiering
- Minska koagelstyrka
- TEG, snabbare resultat
- Starkaste korrelationer
  - Fibrinogen - TEG-MA
  - EBL - Fibrinogen
  - EBL – TEG-MA

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. Thorn
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.

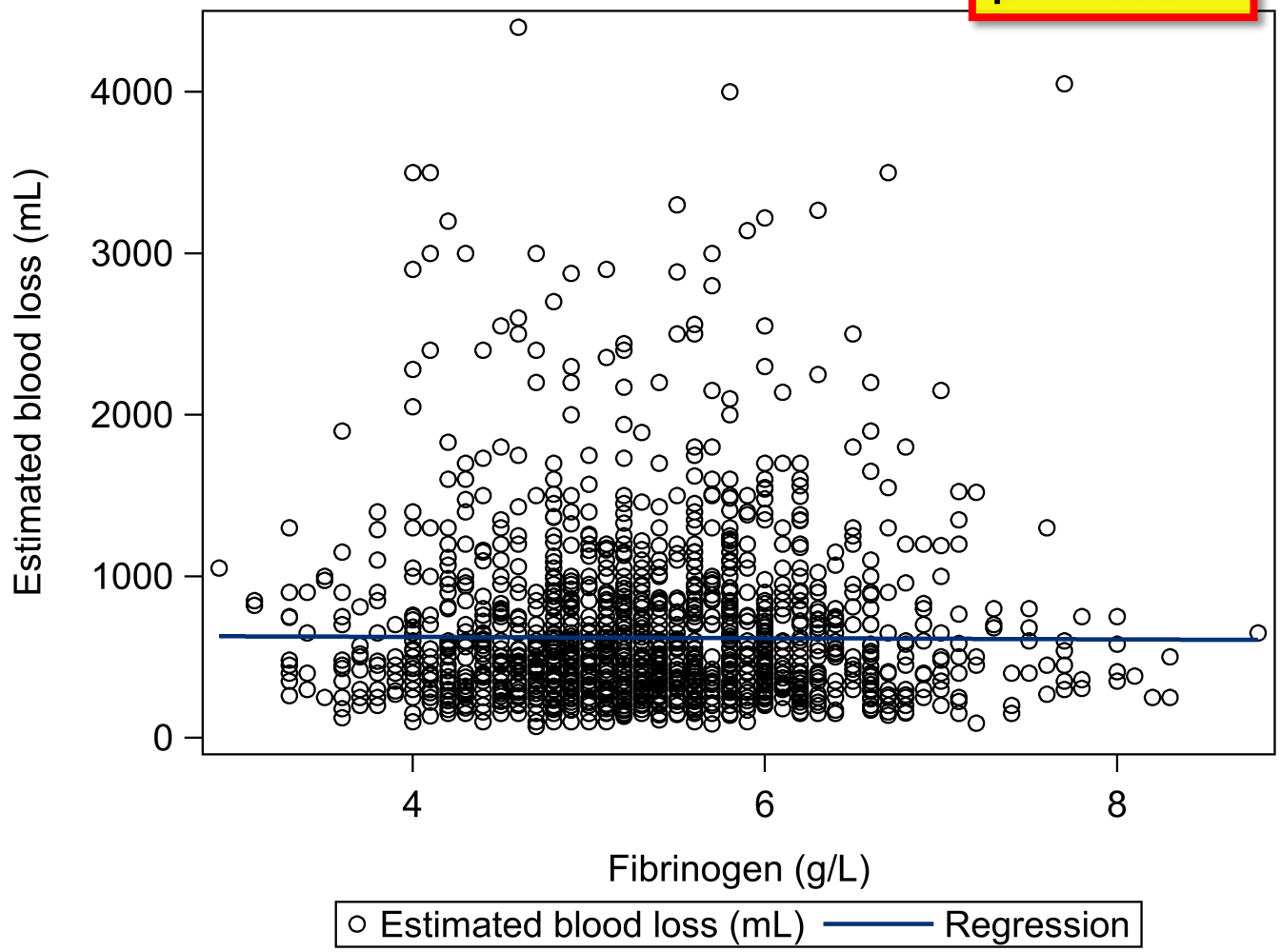
Methods: 1951 healthy women were included in a prospective observational study. Fibrinogen concentration was determined at admission to the labour ward and in a subgroup of women (n=80) also after the placenta was delivered. Bleeding volume postpartum was estimated by weighing surgical sponges and pads 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.

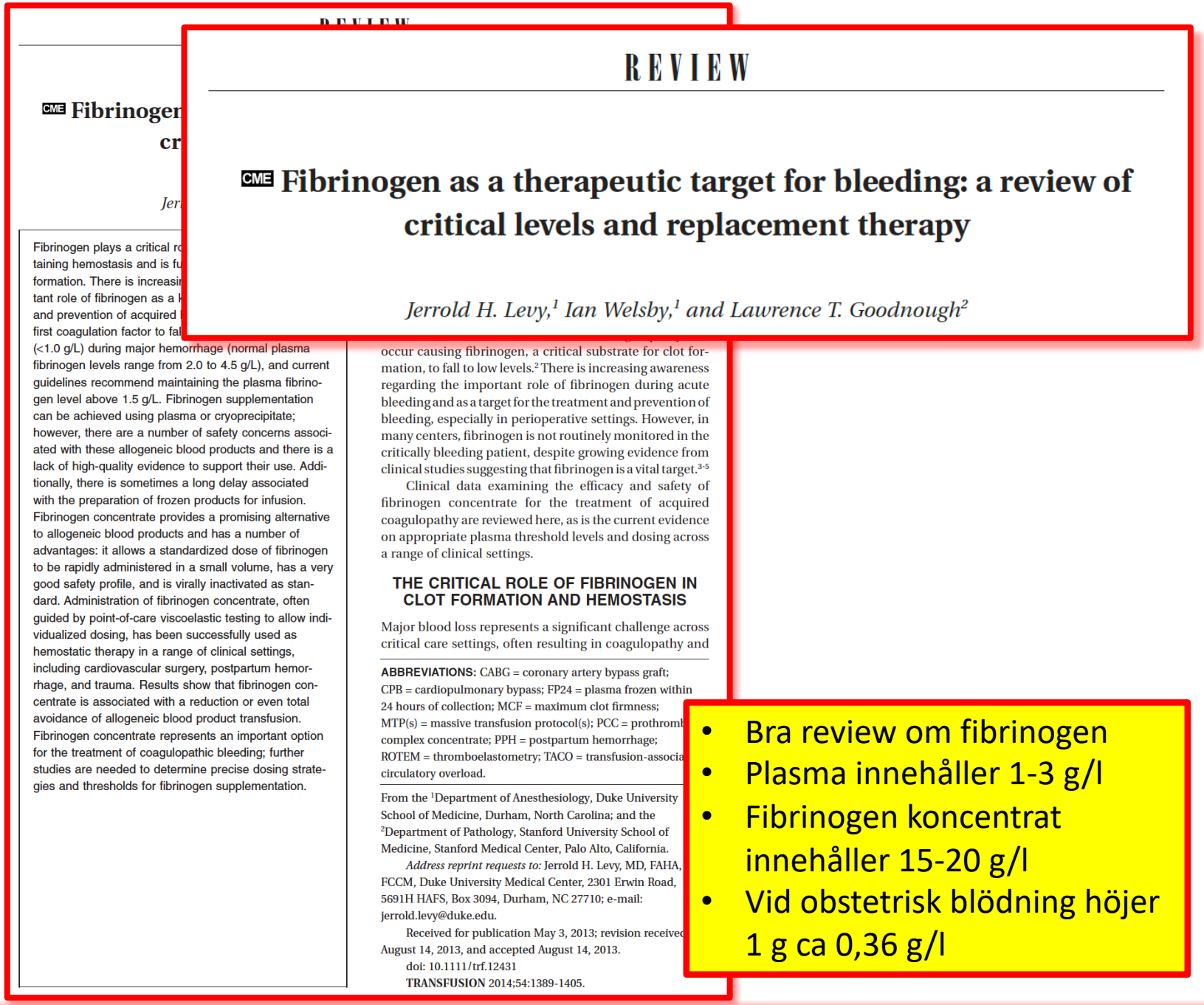
r = 0.9
p < 0.0001

r = 0.003
p = 0.9



- Fibrinogen sjunker ej under partus
- Fibrinogen predikterar ej PPH
- PPH prediktorer:
  - Exploration postpartum
  - Kejsarsnitt
  - Instrumentell förlossning
  - Oxytocin stimulering

Fibrinogen plays a critical role in achieving and maintaining hemostasis and is fundamental to effective clot formation. There is increasing awareness of the important role of fibrinogen as a key target for the treatment and prevention of acquired bleeding. Fibrinogen is the first coagulation factor to fall to critically low levels (<1.0 g/L) during major hemorrhage (normal plasma fibrinogen levels range from 2.0 to 4.5 g/L), and current guidelines recommend maintaining the plasma fibrinogen level above 1.5 g/L. Fibrinogen supplementation can be achieved using plasma or cryoprecipitate; however, there are a number of safety concerns associated with these allogeneic blood products and there is a lack of high-quality evidence to support their use. Additionally, there is sometimes a long delay associated with the preparation of frozen products for infusion. Fibrinogen concentrate provides a promising alternative to allogeneic blood products and has a number of advantages: it allows a standardized dose of fibrinogen to be rapidly administered in a small volume, has a very good safety profile, and is virally inactivated as standard. Administration of fibrinogen concentrate, often guided by point-of-care viscoelastic testing to allow individualized dosing, has been successfully used as hemostatic therapy in a range of clinical settings, including cardiovascular surgery, postpartum hemorrhage, and trauma. Results show that fibrinogen concentrate is associated with a reduction or even total avoidance of allogeneic blood product transfusion. Fibrinogen concentrate represents an important option for the treatment of coagulopathic bleeding; further studies are needed to determine precise dosing strategies and thresholds for fibrinogen supplementation.



REVIEW

CME Fibrinogen as a therapeutic target for bleeding: a review of critical levels and replacement therapy

Jerrold H. Levy,[1] Ian Welsby,[1] and Lawrence T. Goodnough[2]

Fibrinogen plays a critical role in achieving and maintaining hemostasis and is fundamental to effective clot formation. There is increasing awareness of the important role of fibrinogen as a key target for the treatment and prevention of acquired bleeding. Fibrinogen is the first coagulation factor to fall to critically low levels (<1.0 g/L) during major hemorrhage (normal plasma fibrinogen levels range from 2.0 to 4.5 g/L), and current guidelines recommend maintaining the plasma fibrinogen level above 1.5 g/L. Fibrinogen supplementation can be achieved using plasma or cryoprecipitate; however, there are a number of safety concerns associated with these allogeneic blood products and there is a lack of high-quality evidence to support their use. Additionally, there is sometimes a long delay associated with the preparation of frozen products for infusion. Fibrinogen concentrate provides a promising alternative to allogeneic blood products and has a number of advantages: it allows a standardized dose of fibrinogen to be rapidly administered in a small volume, has a very good safety profile, and is virally inactivated as standard. Administration of fibrinogen concentrate, often guided by point-of-care viscoelastic testing to allow individualized dosing, has been successfully used as hemostatic therapy in a range of clinical settings, including cardiovascular surgery, postpartum hemorrhage, and trauma. Results show that fibrinogen concentrate is associated with a reduction or even total avoidance of allogeneic blood product transfusion. Fibrinogen concentrate represents an important option for the treatment of coagulopathic bleeding; further studies are needed to determine precise dosing strategies and thresholds for fibrinogen supplementation.

occur causing fibrinogen, a critical substrate for clot formation, to fall to low levels.[2] There is increasing awareness regarding the important role of fibrinogen during acute bleeding and as a target for the treatment and prevention of bleeding, especially in perioperative settings. However, in many centers, fibrinogen is not routinely monitored in the critically bleeding patient, despite growing evidence from clinical studies suggesting that fibrinogen is a vital target.[3-5]

Clinical data examining the efficacy and safety of fibrinogen concentrate for the treatment of acquired coagulopathy are reviewed here, as is the current evidence on appropriate plasma threshold levels and dosing across a range of clinical settings.

THE CRITICAL ROLE OF FIBRINOGEN IN CLOT FORMATION AND HEMOSTASIS

Major blood loss represents a significant challenge across critical care settings, often resulting in coagulopathy and

ABBREVIATIONS: CABG = coronary artery bypass graft; CPB = cardiopulmonary bypass; FP24 = plasma frozen within 24 hours of collection; MCF = maximum clot firmness; MTP(s) = massive transfusion protocol(s); PCC = prothrombin complex concentrate; PPH = postpartum hemorrhage; ROTEM = thromboelastometry; TACO = transfusion-associated circulatory overload.

From the [1]Department of Anesthesiology, Duke University School of Medicine, Durham, North Carolina; and the [2]Department of Pathology, Stanford University School of Medicine, Stanford Medical Center, Palo Alto, California.

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doi: 10.1111/trf.12431

TRANSFUSION 2014;54:1389-1405.

- Bra review om fibrinogen
- Plasma innehåller 1-3 g/l
- Fibrinogen koncentrat innehåller 15-20 g/l
- Vid obstetrisk blödning höjer 1 g ca 0,36 g/l

En tisdag vid lunch:
Manuell exploration pga PPH
Frisk kvinna, aortakompression

Diagnos?

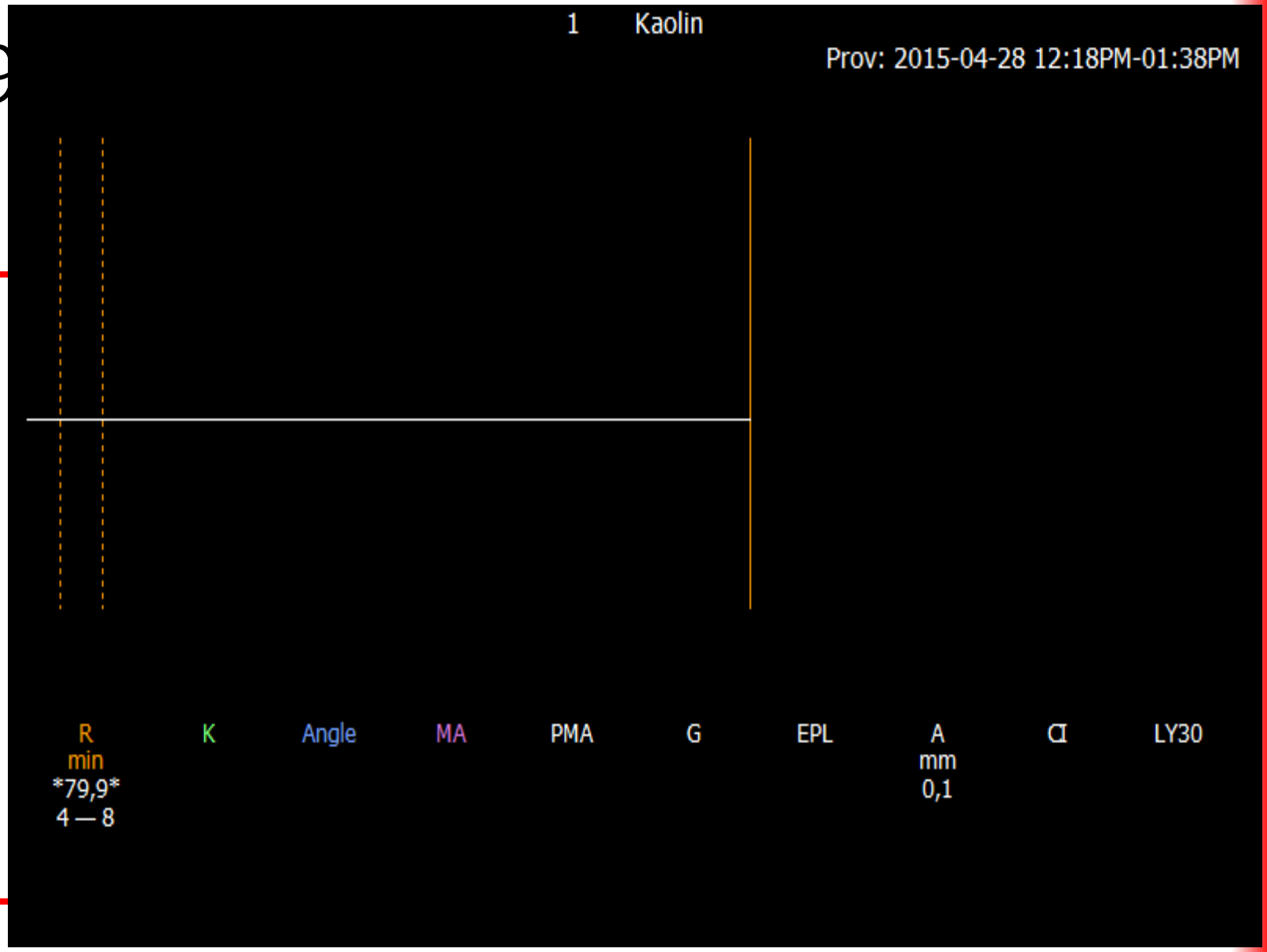
1. Tone
   - Postpartum blödning pga atoni
2. Trauma
   - Postpartum blödning pga cervix laceration
3. Tissue
   - Postpartum blödning pga placentarester
4. Trombin
   - DIC pga sepsis

En liten stund sen

- Intubations narkos
  - Alfentanil, tiopental och suxa
  - Får en cirkulatorisk chock
- Oxytocin, metylergometrin, misoprostol, försök till ballo
- Sivande blödning från ytlig b
- Ytterligare 1000 ml blödning
- Mörjiga hinnor utbyte

Kvinna född 19

- Anamnes
  - Frisk
- Aktuell graviditet
  - 3-gravida 1-para
  - Partus
    - Söndag kl 05.06
  - Hem
    - Måndag kl 14.05

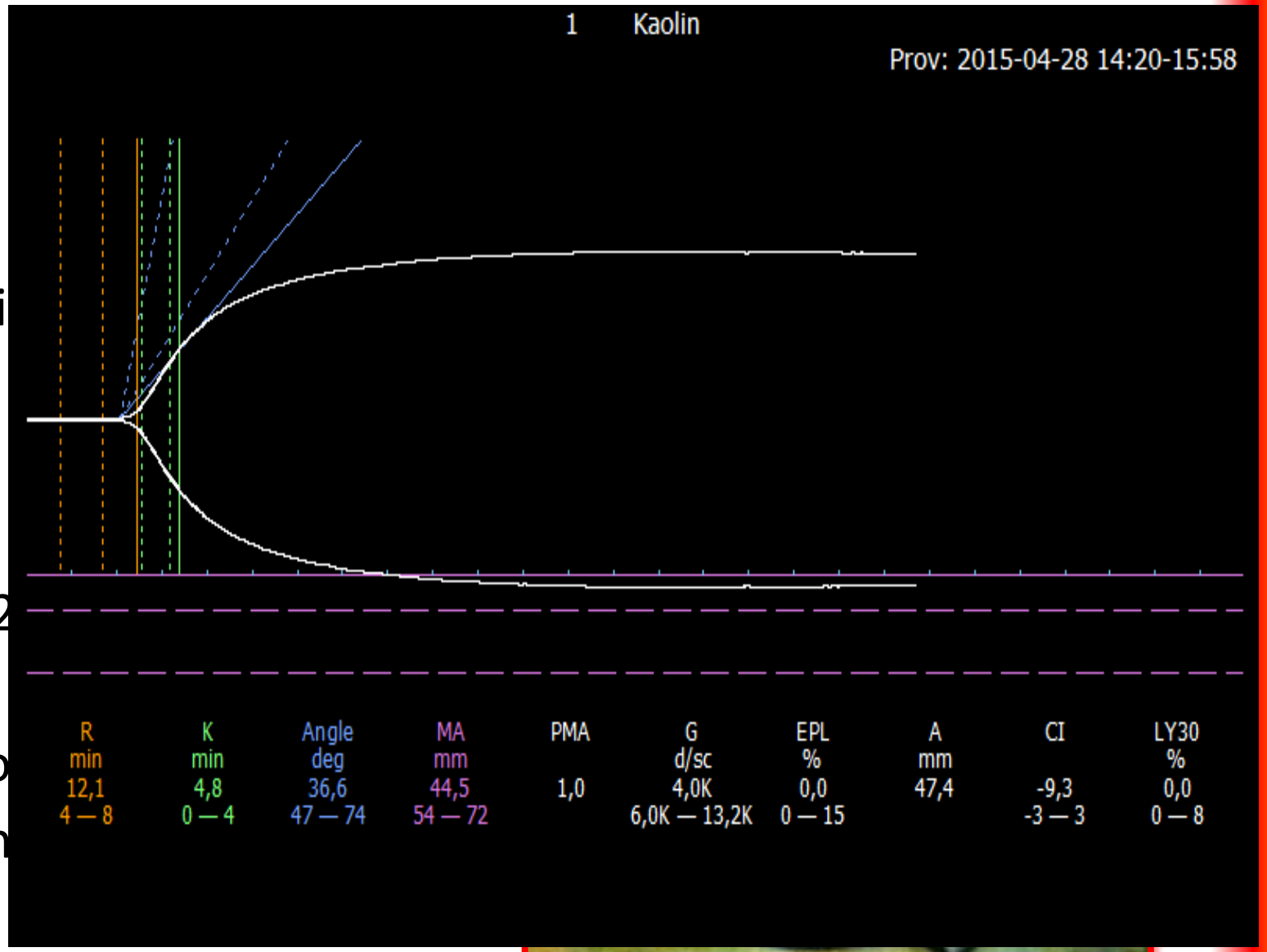


Prover tisdag

- Kl 10.30 på antenatal
  - Hb 117, TPK 123, CRP 150
  - PK 1.0, APTT 96
  - Fibrinogen 1.4
- Kl 11.21 på operation
  - Hb 107, TPK 70
  - PK 1.1, APTT 148
  - Fibrinogen 1.0
  - AT 0.52, D-dimer >20

Åtgärder på ope

- Ringeracetat + venofundi
- Atonibehandling
- Tranexamsyra
- Fenylefrin, noradrenalin
- Erytrocyter 2 st, plasma 2
- Fibrinogen 2 + 2 gram
- Upprepade blodprover o
- Tazocin + Nebcina (engån
- Till IVA i respirator



Sepsis med DIC och PPH
Grupp A Streptokocker

- Söndag — Partus
- Måndag — Hem
- Tisdag — PPH
- Två veckor — IVA
  - En vecka respirator
  - Multiorgansvikt
- 5 ½ vecka — Hem

DIC

OBSTETRICS

American Journal of Obstetrics & Gynecology 2015

Disseminated intravascular coagulation in pregnancy: insights in pathophysiology, diagnosis and management

Offer Erez, MD; Salvatore Andrea Mastrolia, MD; Jecko Thachil, MD

Uncontrolled peripartum bleeding, resulting in disseminated intravascular coagulation (DIC), is one of the leading causes for maternal mortality worldwide.[1] This is in spite of an

Disseminated intravascular coagulation (DIC) is a life-threatening situation that can arise from a variety of obstetrical and nonobstetrical causes. Obstetrical DIC has been associated with a series of pregnancy complications including the following: (1) acute peripartum hemorrhage (uterine atony, cervical and vaginal lacerations, and uterine); (2) placental abruption; (3) preeclampsia/eclampsia/hemolysis, elevated liver es, and low platelet count syndrome; (4) retained stillbirth; (5) septic abortion and erine infection; (6) amniotic fluid embolism; and (7) acute fatty liver of pregnancy. diagnosis and understanding of the underlying mechanisms of disease leading to mplication in essential for a favorable outcom and treatment modalities along with bedside ay assist the clinician in the diagnosis and m treatment are essential for the successful m

ords: acute fatty liver of pregnancy, endothe zymes, and low platelet count (HELLP) syndr

- Acute peripartum hemorrhage
- Placental abruption
- Preeclampsia/eclampsia/HELLP syndrome
- Retained stillbirth
- Septic abortion and intrauterine infection
- Amniotic fluid embolism
- Acute fatty liver of pregnancy

- Omedelbar behandling
- Behandla orsak
- Ge samtidigt:
  - Tranexamsyra
  - Blod/Plasma/Tromb
  - Fibrinogen
- Upprepa provtagning

Desmopressin

- Inga studier på postpartum blödning
- Andra studier, ingen skillnad blödning
- Indikation profylax vid hemostasrubbning
  - von Willebrand
  - Hemofili A
  - Trombocytdysfunktion
- Risk vattenintoxikation

Haemophilia

Haemophilia (2012), **18**, 25–33 DOI: 10.1111/j.1365-2516.2011.02573.x

REVIEW ARTICLE

A Systematic Review: The use of desmopressin for treatment and prophylaxis of bleeding disorders in pregnancy

D. E. TRIGG, I. STERGIOTOU, P. PEITSIDIS and R. A. KADIR
The Royal Free Hospital, London, UK

Summary. Desmopressin (DDAVP) is commonly used for treatment and prevention of bleeding complications in patients with bleeding disorders including haemophilia A, von Willebrand's disease (VWD) and other less common disorders. This article reviews the current evidence for the use of DDAVP in pregnancy to clarify its efficacy and safety with regard to maternal and foetal outcome. A search of the literature found 30 studies that reported DDAVP use in pregnancy for prophylaxis or treatment of bleeding complications with 216 pregnancies reported in total. The most common indication was prophylaxis for prevention of bleeding during pregnancy and postpartum haemorrhage. DDAVP was used successfully in the first and early second trimester for bleeding prophylaxis in 50 pregnancies. No postpartum bleeding complications were reported in 167 out of 172 pregnancies when DDAVP was used for peripartum haemostatic cover. Twenty-nine studies reported no significant adverse events as a result of treatment with DDAVP. One case of water intoxication seizure and one case of premature labour following the use of DDAVP was reported in a single study. Other maternal side effects included facial flushing and headache and were reported by one study. These side effects were generally well tolerated by patients. There were no other significant adverse events reported in any of the studies as a result of DDAVP use. Foetal outcome was recorded in ten studies with no adverse foetal outcomes. In conclusion, this review shows that DDAVP in selected cases is effective in reducing bleeding complications associated with pregnancy and childbirth with a good safety record. Further research is needed to confirm these findings as they are based on the currently available evidence from small studies and case series only.

Keywords: delivery, desmopressin, haemophilia, pregnancy, safety, von Willebrand's disease

Rekombinant faktor VIIa

Obstetric Anesthesiology
Section Editor: Cynthia A. Wong

Recombinant Activated Factor VII in Obstetric Hemorrhage: Experiences from the Australian a Zealand Haemostasis Registry

Louise E. Phillips, PhD*
Claire McLintock, MBBS†
Wendy Pollock, PhD‡
Stephen Gatt, MD§
Philip Popham, MD‖
Gary Jankelowitz, MBBS¶
Robert Ogle, MBBS#
Peter A. Cameron, MD**

OBJECTIVE: Through the Australian and New Zealand Hae report on the Australian and New Zealand experience with factor VII (rFVIIa) in obstetric patients.
METHODS: The role of rFVIIa for off-label indications, incl surgery, and severe postpartum hemorrhage, remains cont stasis Registry established by Monash University in Melbour off-label use of rFVIIa across Australia and New Zealand. Th was to summarize Registry data for all obstetric hemorrhag rFVIIa at participating hospitals between January 2002 and outcome measures were reduction or cessation of bleedin response), mortality, and hysterectomy rate.
RESULTS: During the study period, the Registry received data included 110 cases of administration of rFVIIa in obste hospitals, comprising 5% of the total Registry populatio treated for acute hemorrhage. Women received median individual doses of 92 μg/kg (73–100) of rFVIIa (median [58–108]), and 78% of patients received a single dose. The p rFVIIa was 76% with 64% responding to the first dose. women were alive at 28 days. Forty-three women (41%) un before receiving rFVIIa and, of those remaining, 13 (21%) after rFVIIa therapy. Two thromboembolic events (1 pulm deep venous thrombosis) and 1 case of hypoxic-ischemic en from severe anoxia were reported.
CONCLUSIONS: The reported effect of rFVIIa in many, but not positive. There was no mortality as a result of thrombo Randomized, controlled trials are required to confirm its saf assess the possibility that use at an earlier stage in treatmen hemorrhage may avoid the need to resort to postpartum hy of bleeding, thus preserving fertility.
(Anesth Analg 2009;109:1908–15)

REVIEW

CURRENT OPINION

The role of recombina obstetric hemorrhage

Jouni Ahonen

Purpose of review
To review the literature regarding the use of r postpartum hemorrhage (PPH).
Recent findings
The previous and recent case reports and cas management of severe PPH refractory to stan studies limits the value of the available data. components of the coagulation cascade such relocate into the extravascular space and ren effect longer than the short circulatory half-life
Summary
Although some preliminary guidelines have b the practice of using rFVIIa in PPH is far from an inadequate transfusion therapy. Therefore, frozen plasma, fibrinogen concentrate (or cry atony are essential before considering admin
Keywords
coagulation, postpartum hemorrhage, recomb

INTRODUCTION

Recombinant activated factor VII (rFVIIa; NovoSeven, Novo Nordisk A/S, Bagsvaerd, Denmark) is licensed for the treatment of bleeding episodes in patients with congenital hemophilia A or B and who have developed inhibitors to FVIII or FIX; and in patients with FVII deficiency or Glanzmann's thrombasthenia with anti-GpIIb/IIIa antibodies. It induces hemostasis at the site of vascular injury independent of the presence of FVIII and FIX by forming complexes with exposed tissue factor [1,2]. However, the small amount of thrombin produced on tissue factor-bearing cells is not sufficient to result in clot formation, and platelet-surface coagulation factor X (FX) activation is required for a large amount of thrombin generation, which then results in the cleavage of fibrinogen to fibrin. Because affinity, high effective levels reased thrombin of thrombin (TAFI) and a tight fibrin

Journal of Thrombosis and Haemostasis, **13**: 520–529 DOI: 10.1111/jth.12844

ORIGINAL ARTICLE

Recombinant human FVIIa for reducing the need for invasive second-line therapies in severe refractory postpartum hemorrhage: a multicenter, randomized, open controlled trial

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Summary. *Background:* Case reports on recombinant human factor VIIa (rhuFVIIa) use in women with severe postpartum hemorrhage (PPH) showed encouraging results, but no randomized controlled trial (RCT) is available. *Patients and methods:* Eighty-four women with severe PPH unresponsive to uterotonics were randomized to receive one early single rhuFVIIa infusion (n = 42) or standard care (no rhuFVIIa; n = 42). The primary efficacy outcome measure was the reduction of the need for specific second-line therapies, such as interventional hemostatic procedures, for blood loss and transfusions. The primary safety outcome measure was the number of deaths and thrombotic events during the 5 days following rhuFVIIa infusion. *Results:* rhuFVIIa was associated with a reduction in the number of patients who needed second-line therapies compared with controls (standard care). Specifically, 39/42 (93%) patients in the standard care arm received second-line therapies and 22/42 (52%) patients in the rhuFVIIa arm (absolute difference, 41%; range, 18–63%; relative risk RR, 0.56 [0.42–0.76]). The delivery mode (vaginal or Cesarean section) did not affect the primary outcome. No death occurred. Two venous thrombotic events were recorded in the rhuFVIIa arm: one ovarian vein thrombosis and one deep vein thrombosis with a non-severe pulmonary embolism. *Conclusion:* This open RCT in women with severe PPH refractory to uterotonics shows that rhuFVIIa reduces the need for specific second-line therapies in about one in three patients, with the occurrence of non-fatal venous thrombotic events in one in 20 patients.

Keywords: FVIIa activated; hysterectomy; postpartum hemorrhage; treatment efficacy; treatment outcome.

Introduction

- Off label use
- Fallserier, obstetriska blödningar
- En randomiserad studie, 2 trombotiska komplikationer
- Finns i vissa guidelines

Mycket viktigare för fungerande hemostas:

Syra-bas

Calcium

Temperatur

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

Preconditions of Hemostasis in Trauma: A Review. 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. severe bleeding, buffering gic pH values is recomlly with massive transfuBCCs displaying exhausted uffer systems. It completes ostasis n. scular r ione held

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.

Arch Gynecol Obstet (2013) 288:543–549
DOI 10.1007/s00404-013-2812-1

MATERNAL-FETAL MEDICINE

A local hemostatic agent for the management of postpartum hemorrhage due to placenta previa and placenta accreta: a cross-sectional study

Diego Portilla · Cristian Hernández-Giraldo · Bernardo Moreno · Fabio Quijano · Luis R. Hoyos · Ana Milena Angarita · Santiago Madero

Received: 12 December 2012 / Accepted: 13 March 2013 / Published online: 27 March 2013

Abstract
Purpose To describe the use of a local hemostatic agent (LHA) for the management of postpartum hemorrhage (PPH) due to bleeding of the placental bed in patients taken to caesarean section at Fundación Santa Fe de Bogotá University Hospital.
Sample A total of 41 pregnant women who had a caesarean section and developed PPH.
Methods A cross-sectional study. Analysis of all cases of PPH during caesarean section presented from 2006 up to and including 2012 at Fundación Santa Fe de Bogotá University Hospital.
Main outcome measure Emergency hysterectomy due to PPH.
Results The proportion of hysterectomies was 5 vs. 66 % for the group that received and did not receive management with a LHA respectively (PR 0.07, CI 95 % 0.01–0.51 $p < 0.01$). For the group managed without a LHA, 80 % of patients needed hemoderivatives transfusion vs. 20 % of patients in the group managed with a LHA (PR 0.24, CI 95 % 0.1–0.6 $p < 0.01$). A reduction in the mean days of hospitalization in addition to a descent in the proportion of patients admitted to the intensive care unit (ICU) was noticed when comparing the group t
versus the one that did not.
Conclusion An inverse association b
LHA in patients with PPH due to blee
bed and the need to perform an emer
terectomy was observed. Additionally
cant reduction in the mean duration of
hemoderivatives and admission to the

Keywords Postpartum Hemorrhage
Oxidized · Hysterectomy · Placenta p
accreta

Abbreviations

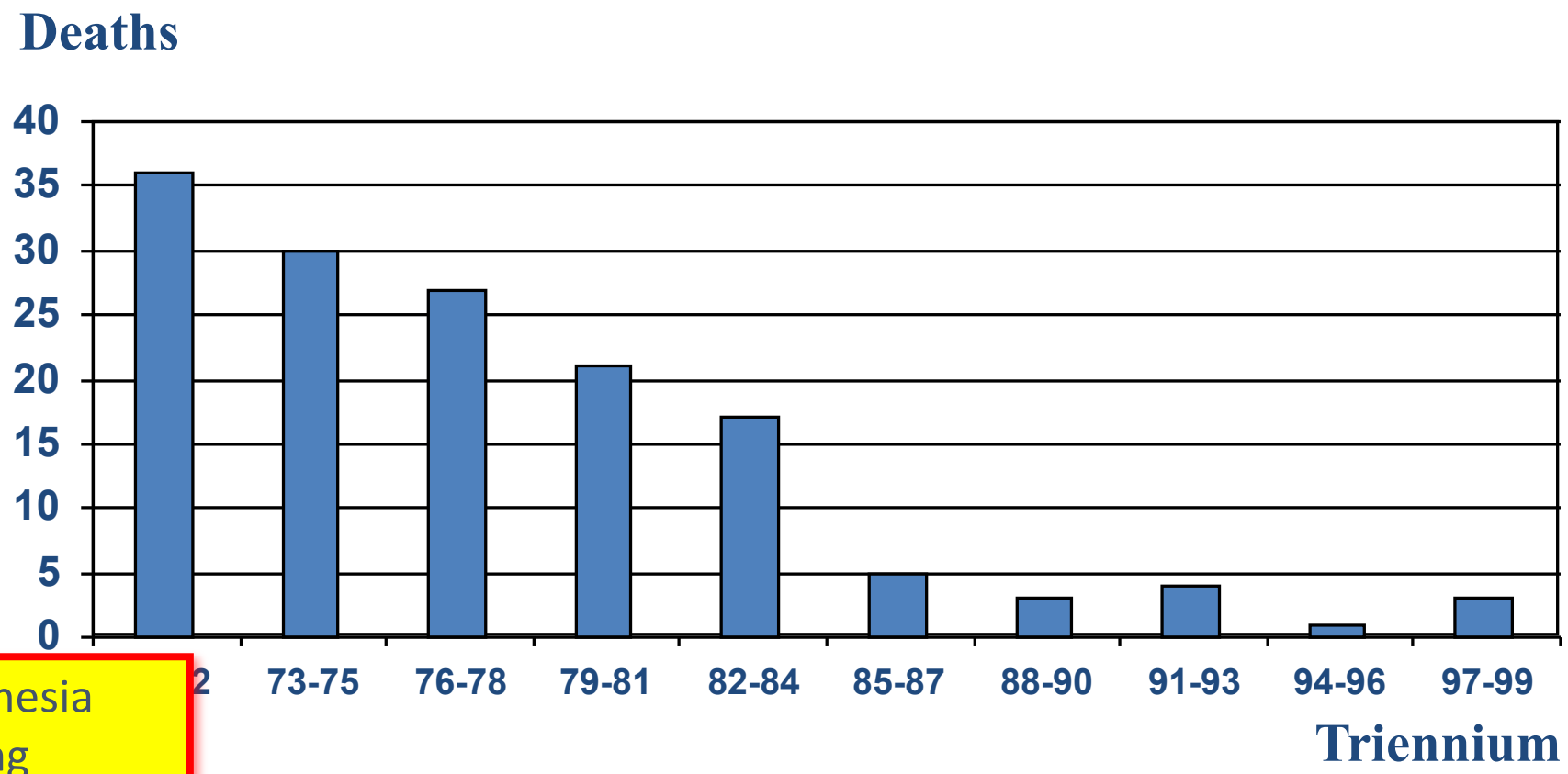
PPH	Postpartum hemorrhage
LHA	Local hemostatic agent
PR	Prevalence ratio
ICU	Intensive care unit

Introduction

Postpartum hemorrhage (PPH) is th

Att fundera på:

Anestesirelaterad maternell mortalitet



- Regional Anaesthesia
- Improved Training
- More Senior Interest
- Better Co-operation

Anestesi och postpartum blödning

Regional anestesi

- Mindre blödning
- Mindre transfusioner
- Mindre mortalitet
- Mindre morbiditet

- Kontraindikation
  - Stor pågående blödning

Generell anestesi

- Mer blödning
- Mer transfusioner
- Ökad mortalitet
- Ökad morbiditet

- Indikation
  - Stor pågående blödning

Generell anestesi och blödning

Spinal, placenta lösning
- Bupivakain tung 6 mg
- Fentanyl 15 ug

The Effects of Volatile Anesthetics on Spontaneous Contractility of Isolated Human Pregnant Uterine Muscle: A Comparison Among Sevoflurane, Desflurane, Isoflurane, and Halothane

Anesth Analg 2006;103(2):443-447

- Inhalationsgaser ger
  - Dosberoende relaxation
  - Uterusmuskulaturen
- Byt inhalationsanestesi
  - Propofolinfusion
  - Optimera O_2/N_2O/fentanyl

We examined the effects of equianesthetic concentrations of sevoflurane, desflurane, isoflurane, and halothane on the s
uterine muscles. We also determin
Uterine specimens were obtained
elective lower-segment cesarean
vertically in tissue chambers. The
exposed to 0.5–3 minimum alveol
absence and presence of the high
blocker, tetraethylammonium, or the adenosine triphosphate-sensitive potassium channel (K_{ATP})-blocker, glibenclamide. The anesthetics examined produced a dose-

Top up EDA, placenta lösning
- Sufenta 20 ug
- Kloroprokain 30 mg/ml 10 ml
- Alt Ropivakain 7,5 mg/ml 10ml

International Journal of Obstetric Anesthesia (2009) **18**, 111–117
0959-289X/$ - see front matter
doi:10.1016/j.ijoa.2008.07.010

ORIGINAL ARTICLE

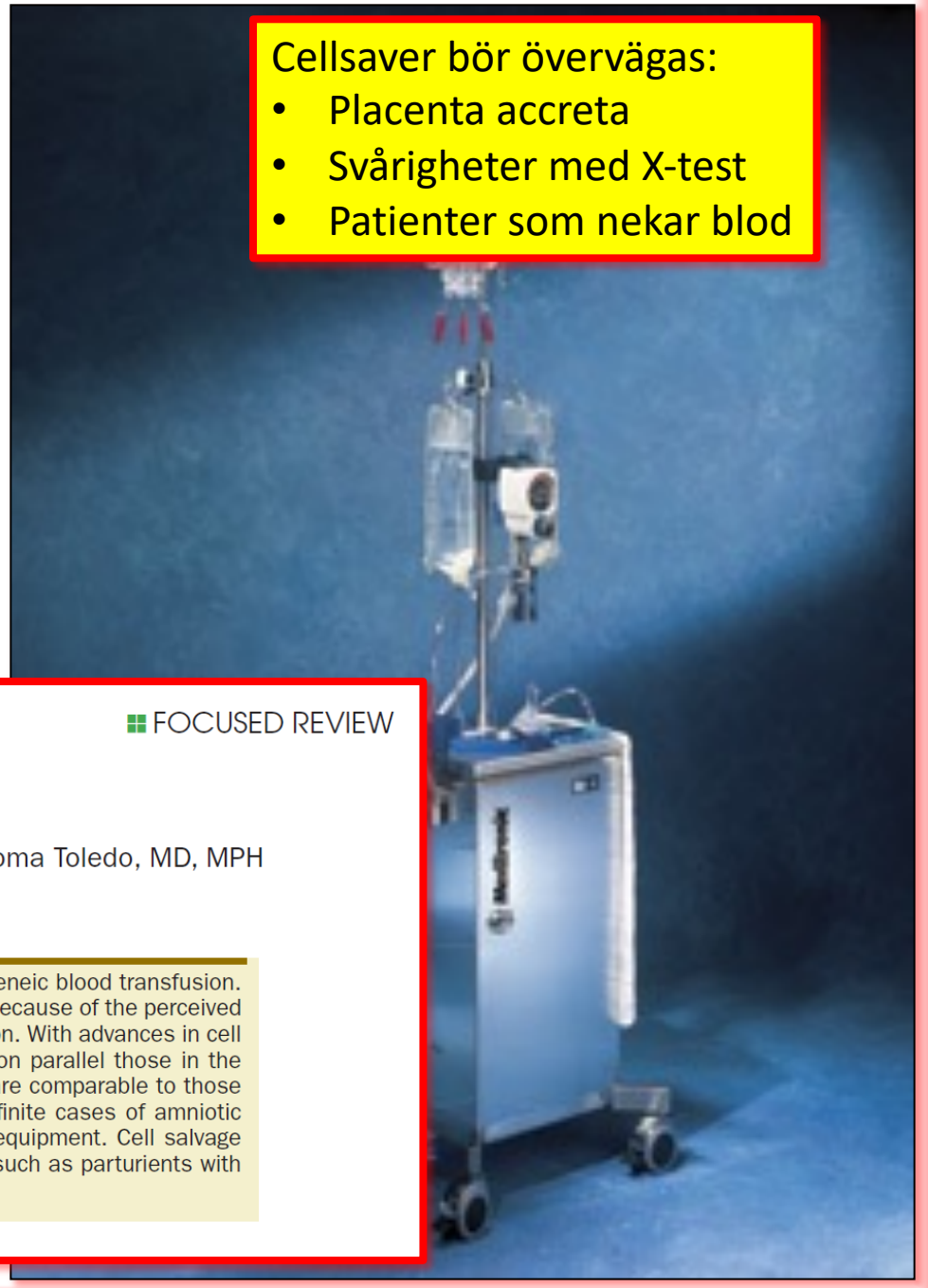
ELSEVIER
www.obstetanesthesia.com

Introduction of cell salvage to a large obstetric unit: the first six months

M. King, I. Wrench, A. Galimberti, R. Spray
Departments of Anaesthesia and Obstetrics, Royal Hallamshire Hospital, Sheffield, UK

ABSTRACT
Background: We introduced red-cell salvage to our obstetric unit following a two-month period of training and education. We report a service evaluation of the first six months of activity from May to October 2007.
Methods: The indications for using cell salvage were: placenta praevia, suspected placental abruption, multiple pregnancy, multiple repeat caesarean, previous history of post partum haemorrhage, refusal of blood transfusion, caesarean section at full dilatation, low preoperative haemoglobin a
Results: The cell saver was used for 4
fusion rate of 22% (10 cases). Blood w
ian volume (range) of blood returned v
a heterologous transfusion fell from 1
that cell salvage was in use ($P = 0.12$
Conclusion: We have successfully intr
largest series of patients reported in t

Cellsaver bör övervägas:
- Placenta accreta
- Svårigheter med X-test
- Patienter som nekar blod



FOCUSED REVIEW

CME **Cell Salvage in Obstetrics**

Haley Goucher, MD, Cynthia A. Wong, MD, Samir K. Patel, MD, and Paloma Toledo, MD, MPH

Intraoperative cell salvage is a strategy to decrease the need for allogeneic blood transfusion. Traditionally, cell salvage has been avoided in the obstetric population because of the perceived risk of amniotic fluid embolism or induction of maternal alloimmunization. With advances in cell salvage technology, the risks of cell salvage in the obstetric population parallel those in the general population. Levels of fetal squamous cells in salvaged blood are comparable to those in maternal venous blood at the time of placental separation. No definite cases of amniotic fluid embolism have been reported and appear unlikely with modern equipment. Cell salvage is cost-effective in patients with predictably high rates of transfusion, such as parturients with abnormal placentation. (Anesth Analg 2015;121:465–8)

Blodåtervinning
- Säker och kan övervägas
- Inga fostervattenembolier
- Leukocytfilter ska brukas

ELSEVIER

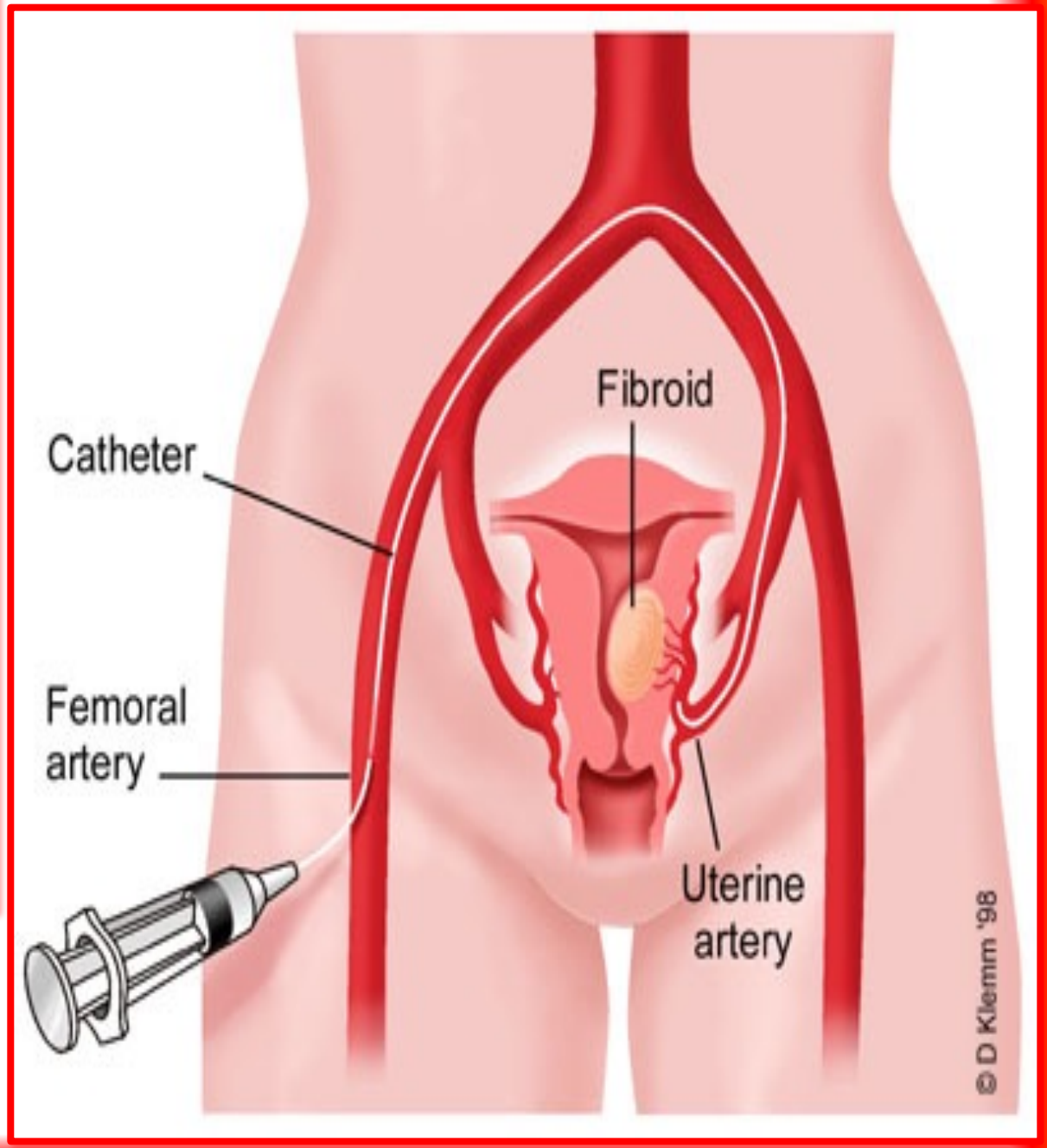
Techniques in Vascular and Interventional Radiology

Postpartum Hemorrhage

Janice Newsome, Jonathan G. Martin, Zachary Bercu, Jay Shah, Haris Shekhani, and Gail Peters

Interventional radiologists are often called for emergent control of abnormal uterine bleeding. Bleeding, even heavy bleeding as a result of uterine fibroids is not a common emergent procedure; instead, pregnancy and pregnancy related conditions, trauma and malignancy associated with bleeding can be the source of many interventional radiology on call events or procedures. Postpartum hemorrhage (PPH) is the most common cause, and is defined as blood loss of 500 mL after vaginal delivery or 1000 mL after cesarean section. Several authors have suggested a simpler definition of any amount of blood loss that creates hemodynamic instability in the mother. Regardless, PPH can be a life-threatening emergency and is a leading cause of maternal mortality requiring prompt action. Primary PPH is bleeding within the first 24 hour of delivery and secondary PPH is hemorrhage that occurs more than 24 hour after delivery. In addition to death, other serious morbidity resulting from postpartum bleeding includes shock, adult respiratory distress syndrome, coagulopathy, and loss of fertility due to hysterectomy. Transcatheter uterine artery embolization was first introduced as a treatment for PPH in 1979. It is a nonsurgical, minimally invasive, extremely safe and effective treatment for controlling excessive bleeding of the female reproductive track usually after conservative measures have failed, yet somewhat underused. Referring providers have limited awareness of the procedure. In hospitals where interventional radiologists have the experience and technical expertise to perform pelvic arteriography and embolization, this therapeutic option can play a pivotal role in the management of emergent obstetric hemorrhage.
Tech Vasc Interventional Rad 20:266-273

KEYWORDS embolization, postpartum bleed, obstetric hemorrhage, uterine artery embolization



Interventionell radiologi
- Kan vara värdefullt
- Kan brukas profylaktiskt
- Finns komplikationer

Invasiv plancenta

SCANDINAVIAN JOURNAL OF UROLOGY, 2017
https://doi.org/10.1080/21681805.2017.1352617

RESEARCH ARTICLE

Striking decrease in blood loss with a urologist-assisted standardized multidisciplinary approach in the management of abnormally invasive placenta

Zeljka Lekic[a], Ehab Ahmed[b], Ralph Peeker[b], Tommy Sporrong[c] and Ove Karlsson[a]

[a]Department of Anesthesiology, Sahlgrenska University Hospital, Gothenburg, Sweden; [b]Department of Urology, Hospital, Gothenburg, Sweden; [c]Department of Obstetrics, Sahlgrenska University Hospital, Gothenburg, Sweden

ABSTRACT

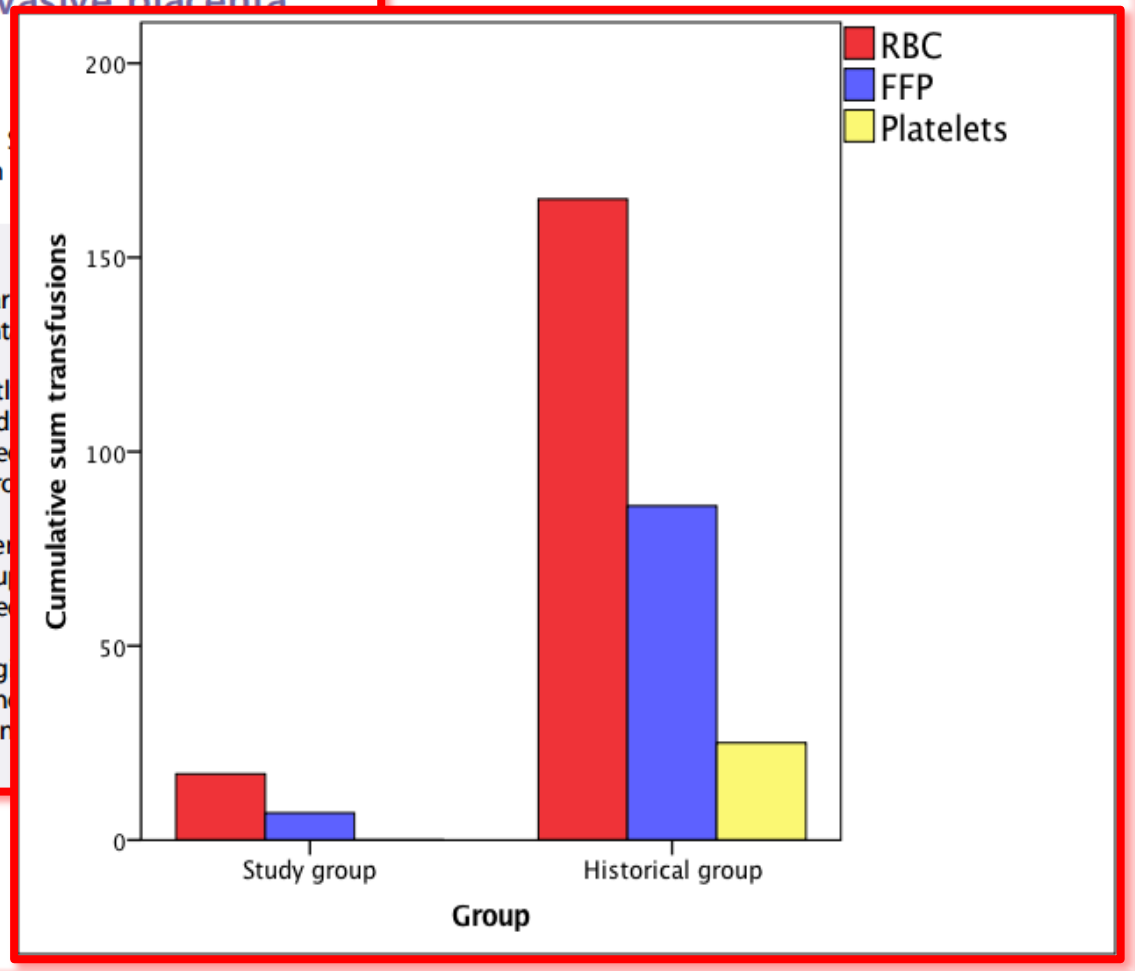
Objective: The aim of this study was to investigate the outcome of a standardized multidisciplinar approach using a modified surgical technique in the management of abnormally invasive placent (AIP), with special reference to blood loss and the need for transfusion.

Materials and methods: Data were collected retrospectively in women managed with a recentl adopted multidisciplinary strategy using a modified surgical approach, involving a urologist (stud group: 10 patients). Women managed before the introduction of this standardized management serve as a control group (nine patients). Comparisons were made between the study group and the contro group. The main outcome measures were blood loss and the need for transfusion in the two groups.

Results: Standardized multidisciplinary management, involving a modified surgical technique pe formed by a urologist, decreased blood loss in the study group compared with the control grou [median 1400 ml (range 400–3000 ml) vs median 8000 ml (2300–40000 ml); $p < .001$]. It also decrease postoperative complications and the need for transfusion of blood products.

Conclusions: Standardized multidisciplinary management of patients with AIP, using a modified surg cal technique, reduces the risks of massive obstetric hemorrhage, the need for massive transfusion an the risk of postoperative complications. Involving an experienced urologist appears to be of paramoun importance in the management of AIP.

- Sjukhus med ingen interventionell radiologi
- Standardiserat multidisciplinärt omhändertagande



Blödning (median och intervall)

- Studiegrupp 1400 ml (400-3000)
- Kontroll grupp 8000 ml (2300-40.000)

Kvinna född 1988

- En kväll i december
- KL 18.08 ringer patient
  - 4 gravida 3 para
  - Gravid vecka 41+4
  - Smärta mage, stenhård uterus
  - Yr och illamående

En kväll i december

- Ca kl 18-19
  - Ambulans
    - systoliskt blodtryck 70 mm Hg
  - Larm till flera sjukhus
- Kl 19.38
  - Specialförlossningen
  - Kallsvettig och smärtpåverkad
  - Svårpalperade pulsationer

En kväll i december

- Kl 19.48
  - Knivstart larmsnitt (urakut snitt)
  - Gynekologen slog ut larmsnitt, på mamma indikation
  - Anestesiologen söver, tror på barn indikation
- Kl 19.49
  - Slapp och blekt barn
  - Placenta fritt i uteruskavitet, dvs ablatio
  - Riklig blödning, även diffus
  - Anestesiolog ringer dit bakjour

Operation 19.48 – 23.20

Klinik	**Åtgärd**
• Atoni	• Oxytocin, metylergometrine, karboprost, misoprostol • Ballong • Tranexamsyra • Blod/plasma/trombocyter
• Blödning 4000 ml	
• Prover kl 19.46	• Hb 120, TPK 204, APTT 51, PK 0.9, Fibrinogen <0.6
• Prover kl 20.51	• Hb 59, TPK 73, APTT 92, PK 1.2, Fibrinogen <0.6

Epikris

- Vårdtid 4-10/12
- Diagnos ablatio och hemostasrubbning
- Under vårdtiden infektionskomplikation

Reflektioner

- Test av larmrutin vid byte av plattform
- Hur kommunicera vid larmsnitt (urakut)
- Första Hb värdet 120 g/l
- Kunskap om hemostas vid ablatio


Management of postpartum haemorrhage
Analyses
TEG®, Hb, Platelet
Fibrinogen, D-di
Blood
• Lower head
• Blood press
• 2 large-gauge peri
thesia
halational anaest.
ketamine infusion
mise N20/02 and Fentanyl
• Carboprost
• Misoprostol
• Tranexamic acid
• Antibiotics
d products
/ plasma / pl
initial do
• Recombi
• An
IU/ml
2014-09-09
Aortakompression
Tranexamsyra
NEWS 2/MEOWS
STOPPA PÅGÅENDE BLÖDNINGEN
TEG/ROTEM
FIBRINOGEN
Upprepa provtagning
Hemostas
Blod/Plasma/Trombocyter 4/4/1
Kommunikation och samarbete

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Protocol for postpartum haemorrhage including massive transfusion

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Keywords:
PPH
postpartum haemorrhage
aorta compression
tranexamic acid
transfusion
fibrinogen
FVIIa
FXIII
volatile anaesthesia

Postpartum haemorrhage (PPH) is one of the most common causes of maternal mortality worldwide. Management of PPH depends on the severity of bleeding. If the bleeding is severe, aorta compression can reduce bleeding. It should be followed by insertion of two coarse needles for intravenous access and blood sampling for haemoglobin and haemostasis. Further on, monitoring of vital parameters, as well as provision of extra oxygen and warm crystalloids, should be performed. Uterine atony is the most common cause of PPH and local guidelines for uterotonic drug selection should be followed. Patients with ongoing bleeding should immediately receive surgical care for bleeding control. During severe ongoing bleeding, haemostasis care includes early tranexamic acid, transfusion in ratio 4:4:1 (blood:plasma:platelets), and extra fibrinogen intravenously. If not severe PPH, use goal-directed therapy. During general anaesthesia and uterine atony, stop volatile anaesthesia and change to intravenous anaesthesia.

Introduction

Postpartum haemorrhage (PPH) is one of the most common causes of maternal mortality worldwide [1]. The report, “Saving Lives, Improving Mothers' Care” from MBRRACE-UK shows that haemorrhage was the second most common direct cause of maternal mortality in the United Kingdom (UK) from 2017 to 2019 [2]. In fact, no decline in maternal mortality due to PPH has been observed in the last decades in the UK [2]. PPH has also been reported to led to severe morbidity during pregnancy

Abbreviations: PPH, Postpartum Haemorrhage; FVIIa, activated Factor VII; FXIII, Factor XIII.
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1521-6896/