Con il Patrocinio

COMACCHIO

COMACCHIO (FE), 1 APRILE
2016 PALAZZO BELLINI

DIABETE GESTAZIONALE, IPOTIROIDISMO ED ANEMIA IN GRAVIDANZA

Emorragia postpartum: gestione multidisciplinare

G. Furicchia
Servizio Anestesia-Rianimazione
Azienda Ospedaliero-Universiaria S. Anna Ferrara

- Post partum hemorrhage is a major cause of maternal mortality and morbidity
- The majority of fatal obstetric hemorrhages are potentially avoidable
- Sub-standard care 60-80%

1. Delayed treatment because of underestimation of blood loss
2. Delayed availability of blood products
3. Lack of treatment algorithms
4. Insufficient interdisciplinary communication
5. Inadequate organization

Haeri S et al. Maternal mortility from hemorrhage. Semin Perinatol 2012; 36: 48-55

MBRRACE- Saving Lives. Improving mothers' care 2011-13

PERCHE' LA NECESSITA' DI UN ALGORITMO NELLA HPP?

Coinvolgimento di più figure professionali:
ginecologo/ostetrica,
anestesista,
trasfusionista,
laboratorista,
il radiologo interventista
.....

Tempestività per ridurre eventuali complicanze

Ottimizzare la gestione dell'evento emorragico

(RCOG 2009-2011; CMACE, 2011; Linee Guida AOGOI, 2009).

Gestione multidisciplinare dell'HPP

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FONDAZIONE
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INDICAZIONI GENERALI

I cardini del trattamento dell'EPP sono:

1. il mantenimento della contrattilità uterina, ottenuto tramite mezzi fisici o farmacologici;
2. il mantenimento o sostegno del circolo con opportuna idratazione;
3. la prevenzione o la terapia della coagulopatia emorragica instauratasi.

È inoltre necessario intervenire nella *"golden hour"* per aumentare la probabilità di sopravvivenza della paziente.

(RCOG 2009-2011; Linee Guida AOGOI, 2009).

How Much Time Do We Have?

It is estimated that, if untreated, death occurs on overage in:

- 2- 4 hours from Postpartum Hemorrhage
- 12 hours from Antepartum Hemorrhage
- 48 hours from Eclampsia
- 2 days from Obstructed Labor
- 6 days from Infection

ACOG Practice Bulletin 76, 2006

L'algoritmo qui proposto è basato su un approccio **pragmatico**, che prevede la suddivisione in due punti:

il punto A

riguarda le pazienti con **perdite ematiche tra 500 e 1.000 mL,** senza segni di squilibrio emodinamico, per le quali sono previste **misure base di monitoraggio** e **allerta dei reparti coinvolti**, con l'eventualità di procedere a **terapia trasfusionale mirata**;

il punto B

invece riguarda le pazienti con **perdite ematiche superiori a 1.000 mL,** instabili emodinamicamente, per le quali si suggerisce, oltre **alla correzione** dell'**ipoperfusione con fluidi**, un **supporto precoce della coagulazione con** strumenti di **monitoraggio visco elastico** o, laddove non disponibili**, con terapia trasfusionale precoce**, secondo protocolli predefiniti.

Algoritmo A

HPP emodinamicamente stabile

> 500 ml (Parto spontaneo)

> 1000 ml (Taglio cesareo)

Classificazione dell'emorragia

American College of Surgeons -Committee on Trauma

	Class I	Class II	Class III	Class IV
blood loss (ml)	< 750	750 - 1500	1500 - 2000	> 2000
Blood loss (%)	15	15 - 30	30 – 40	> 40
Pulse rate (bpm)	<100	>100	<120	>140
Blood pressure	Normal	Decreased	Decreased	Decreased
Respiratory rate	14 - 20	20 -30	30- 40	> 35
Urine output (ml/H)	> 30	20 – 30	5 – 15	Negligible
CNS Sintoms	Normal	Anxious	Confused	Lethargic

STANDARD PROTOCOL

Algoritmo A

SOMMINISTRARE OSSIGENO

HPP emodinamicamente stabile

> 500 ml (Parto spontaneo)
> 1000 ml (Taglio cesareo)

Chiedere Aiuto (personale esperto)

Ginecologo
Ostetrica
Anestesista

Allertare

Centro trasfusionale
Sala operatoria
Chirurgia vascolare
Radiologia interventistica

Algoritmo A

Chiedere Aiuto (personale esperto)

Ginecologo
Ostetrica
Anestesista

Allertare

Centro trasfusionale
Sala operatoria
Chirurgia vascolare
Radiologia interventistica

SOMMINISTRARE OSSIGENO

⇧

HPP emodinamicamente stabile

≥ 500 ml (Parto spontaneo)
≥ 1000 ml (Taglio cesareo)

⇩

Uterotonici: Ossitocina
20UI/500ml fisiologica/2h
Massaggio fondo uterino

Catetere vescicale
I° accesso venoso 16/14G

→ Prelievo basale

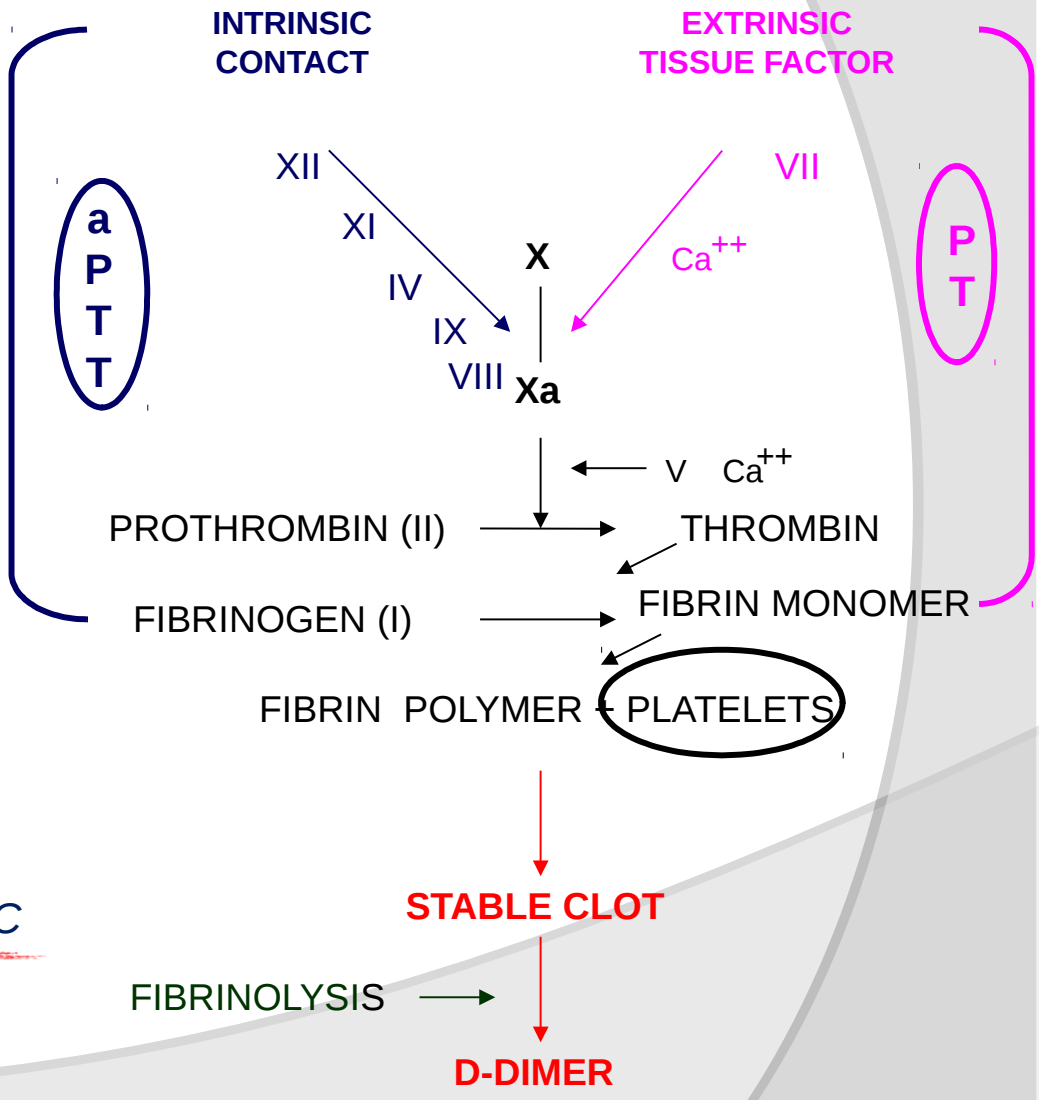
- Emocromo
- PT
- PTT
- Fibrinogeno (Clauss)
- TEST POC (ove disponibile)
- Prove crociate per richiesta urgentissima di emoderivati

⇩

Richiesta di 4 U di GRC e Plasma a disposizione

Plt, aPTT, PT- INR, Fibrinogeno

1. cinetica di formazione del coagulo
2. forza del coagulo
3. interazione tra parete vasi, piastrine, fibrinogeno, fattori della coagulazione circolanti
4. funzione delle piastrine
5. fibrinolisi
6. *ritardo nella risposta*
7. *eseguito su campione plasmatico a 37°C*



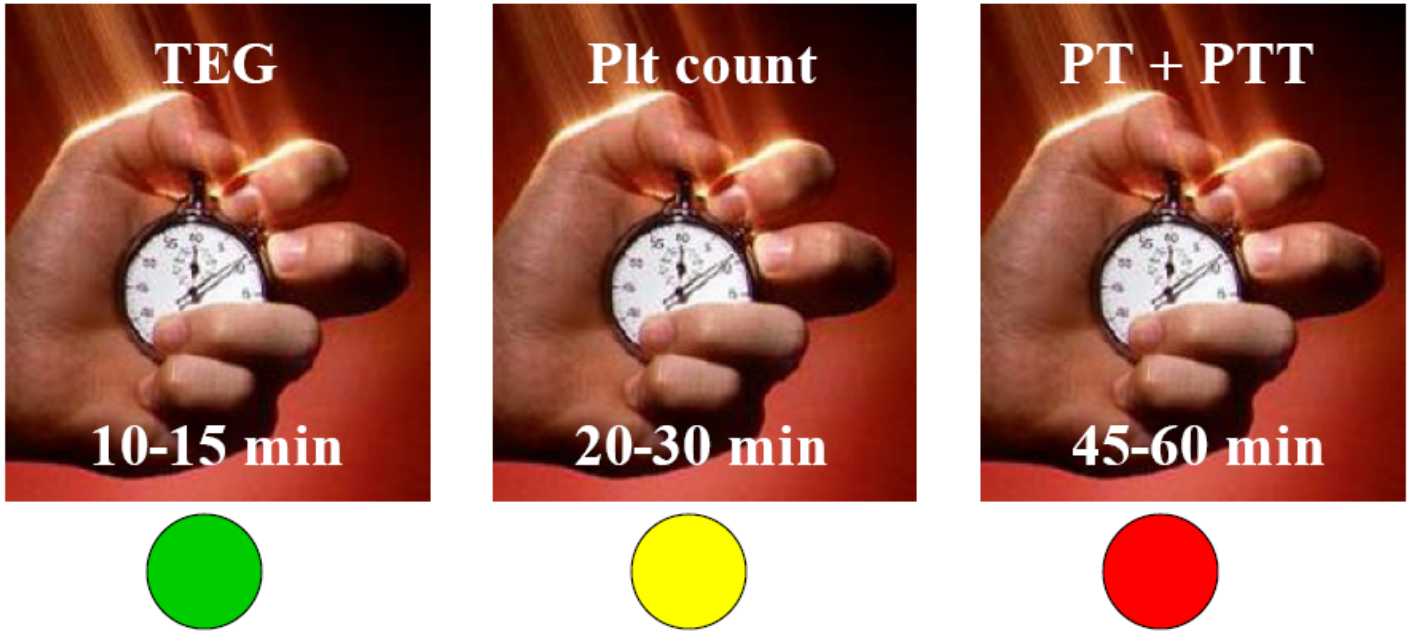
POC vs central laboratory coagulation

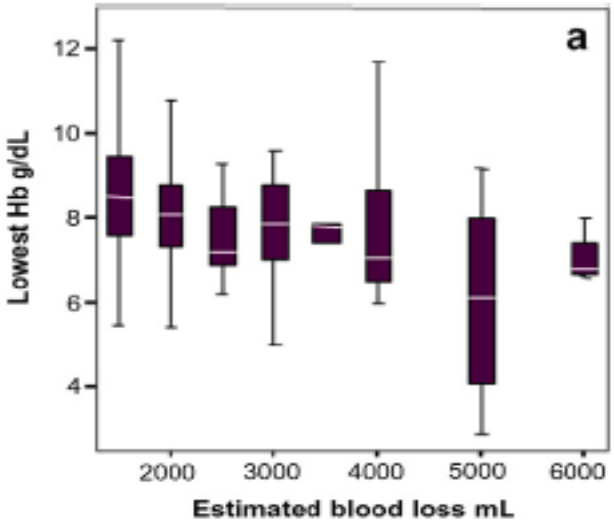
A multicenter study

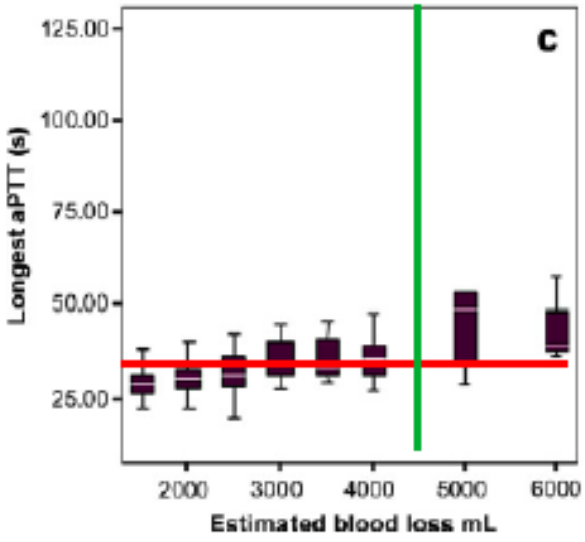
Pierre Toulon[1,2]; Yves Ozier[3]; Annick Ankri[4]; Marie-Hélène Fléron[5]; Geneviève Leroux[6]; Charles Marc Samama[7]

Thromb Haemost 2009; 101: 394–401

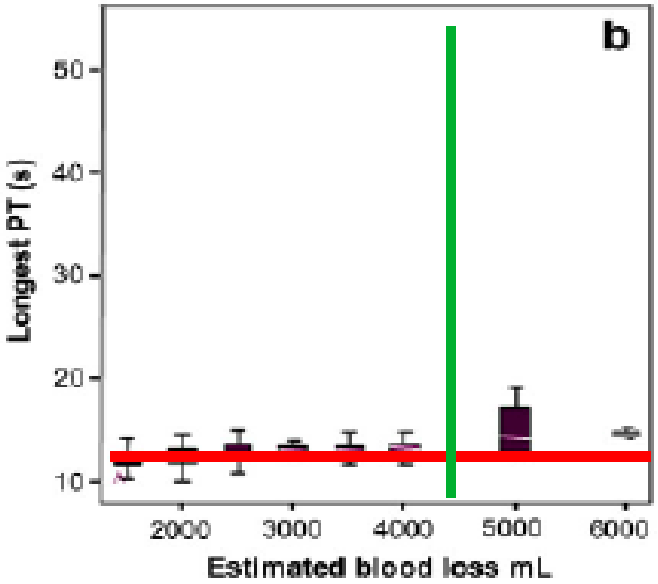
Test results were obtained in **less than 5'** when performed using **POC device** versus a **median turnaround time of 88' (range: 29-235')** when blood collection tubes were sent to the **central laboratory**.

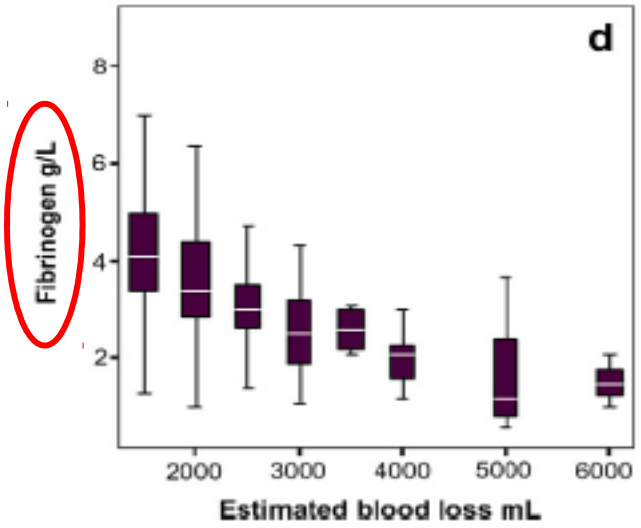






PT and aPTT poorly reflect hemostatic impairment in PPH





Fibrinogen best marker

de Lloyd L et al Standard haemostatic tests following major obstetric haemorrhage IJOA 2011;20:135-41

Fattori della coagulazione: Fibrinogeno

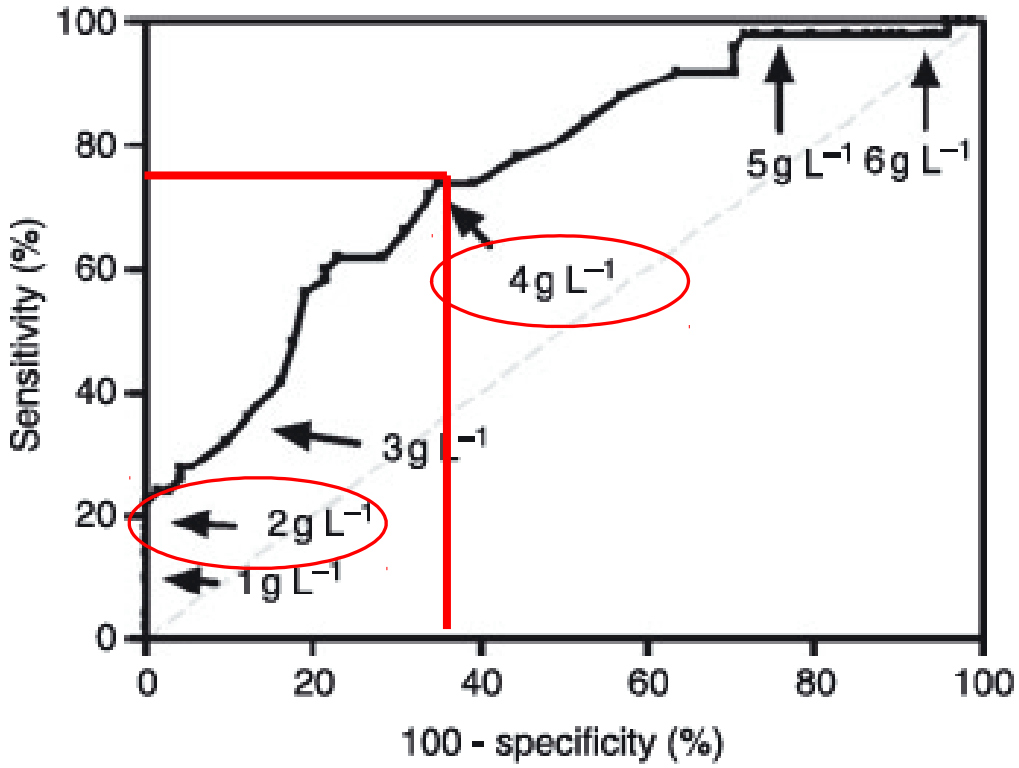


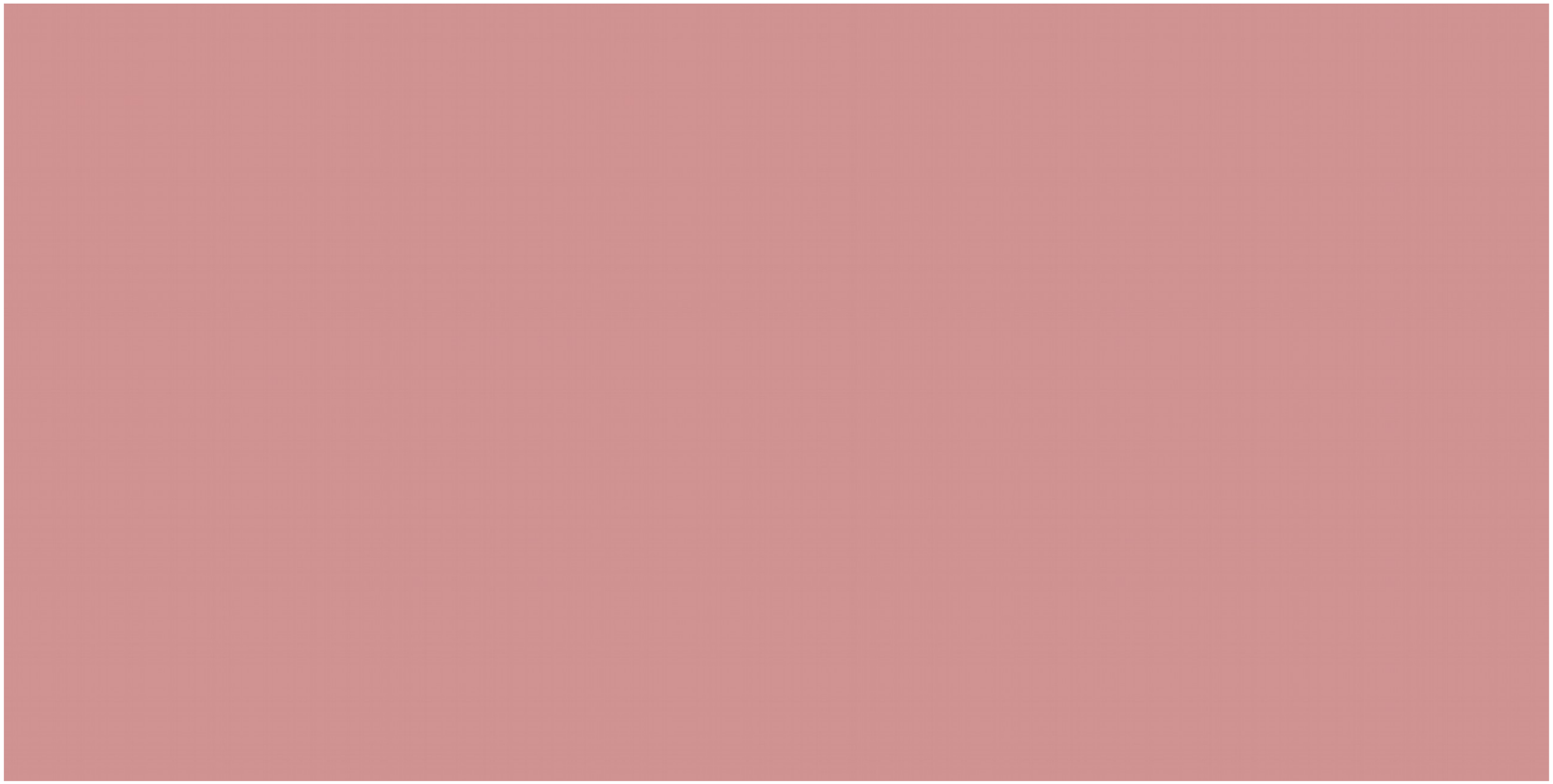
Fig. 3. ROC curve of fibrinogen plasma concentration at H0 for the diagnosis of severe postpartum hemorrhage.

– **Fibrinogen less than 2g/L**
•**100% PPV**

– **Fibrinogen above 4g/L**
•**79% NPV**

Charbit B et al. The decrease of fibrinogen is an early predictor of the severity of postpartum hemorrhage JThromb Haemost 2007;5:266-73

Fattori della coagulazione



Algoritmo A

SOMMINISTRARE OSSIGENO

HPP emodinamicamente stabile

≥ 500 ml (Parto spontaneo)
≥ 1000 ml (Taglio cesareo)

Catetere vescicale
I° accesso venoso 16/14G

Prelievo basale

Uterotonici: Ossitocina 20UI/500ml fisiologica/2h
Massaggio fondo uterino

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Ginecologo
Ostetrica
Anestesista

Allertare
Centro trasfusionale
Sala operatoria
Chirurgia vascolare
Radiologia interventistica

Emocromo
PT
PTT
Fibrinogeno (Clauss)
ATIII

TEST POC
(ove disponibile)

Prove crociate per
urgentissima di em

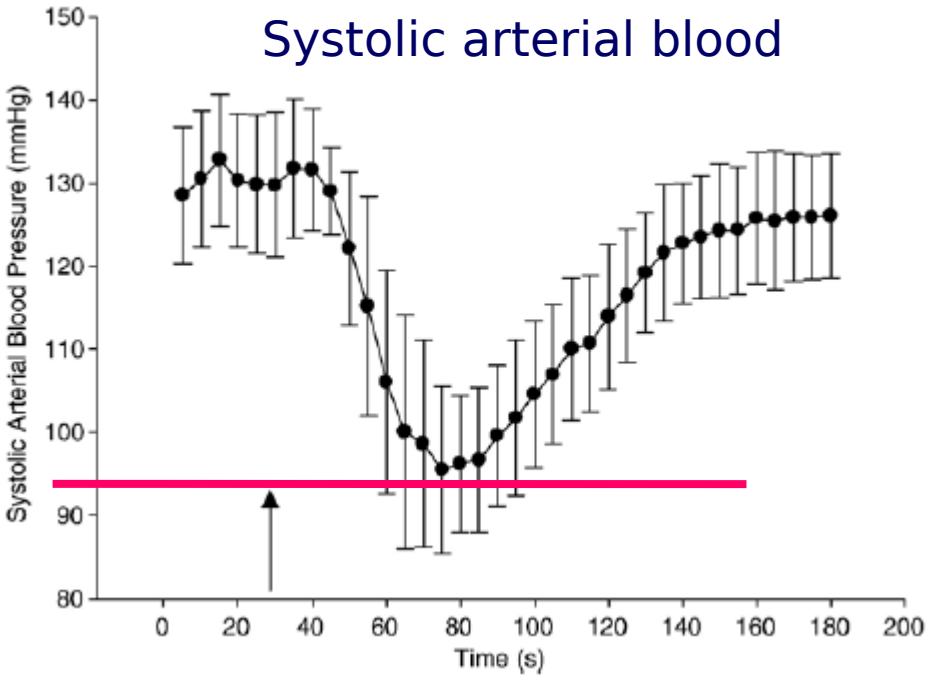
Richiesta di 4 U di GRC e
Plasma a disposizione

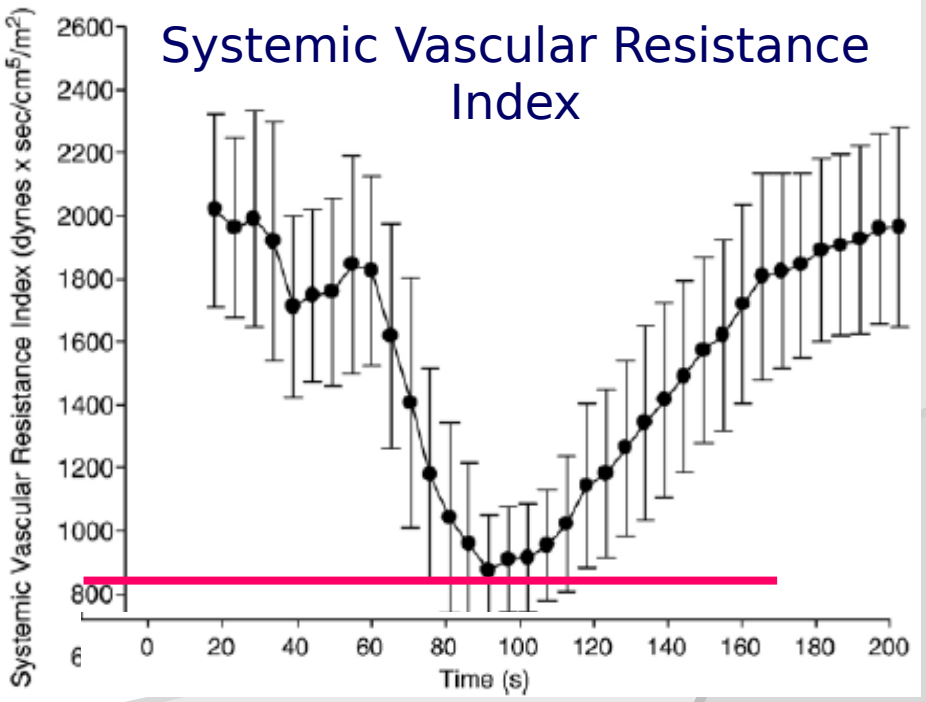
Farmaci uterotonici

Drug	Dose/Rout	Frequency	Contraindications
Oxytocin	**IV: 20UI/500ml NS**	**Continuous**	**None**
Syntocinon		*(2ml)*	
Methylergonovine **PE** *Methergin*	**IM: 0.2mg**	**Every 2-4hr** *(up to 5 doses)*	**Hypertension,**
Misoprostol *Cytotec*	**R: 800/1000mcg**	**Single dose**	**None**
Sulprostone *Nalador*	**IV: 0.5mg/250ml NS** **50ml/h/iv**	**Max 5h**	**Age>35yr** **Smokers**

Am J Obstet Gynecol 2011; 205: 368.e1.

- **Bolus of 5U of oxytocin was injected into a rapidly running intravenous line** immediately after delivery in accordance with department guidelines
- The **LidCOPlus monitor** was used to perform a beat-by-beat analysis of the arterial pressure wave and calculate values for





E. Langesæter Hemodynamic effects of oxytocin during cesarean delivery Int J Gynecol Obstet: 2006; 95:46-47

Algoritmo A

Valutare perdite ematiche ed equilibrio emodinamico

PA
FC
FR
ECG
Pulsossimetria
T°C
Diuresi

10'-30'

Registrazione su schede grafiche

SOMMINISTRARE OSSIGENO

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I° accesso venoso 16/14G

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- **ATIII**

TEST POC
(ove disponibile)

Prove crociate per richiesta urgentissima di emoderivati

II ° accesso venoso 16/14G:
- **Rimpiazzo volemico**
- **Acido Tranexanico ev. (1gr in bolo + 1gr in 8h)**
- **Evitare ipotermia, acidosi e desaturazione**

Richiesta di 4 U di GRC e Plasma a disposizione

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

CRITICAL CARE

RESEARCH Open Access

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

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

Temperature management

Recommendation 16 We recommend early application of measures to reduce heat loss and warm the hypothermic patient in order to achieve and maintain normothermia. (Grade 1C)

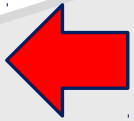
Fluid therapy

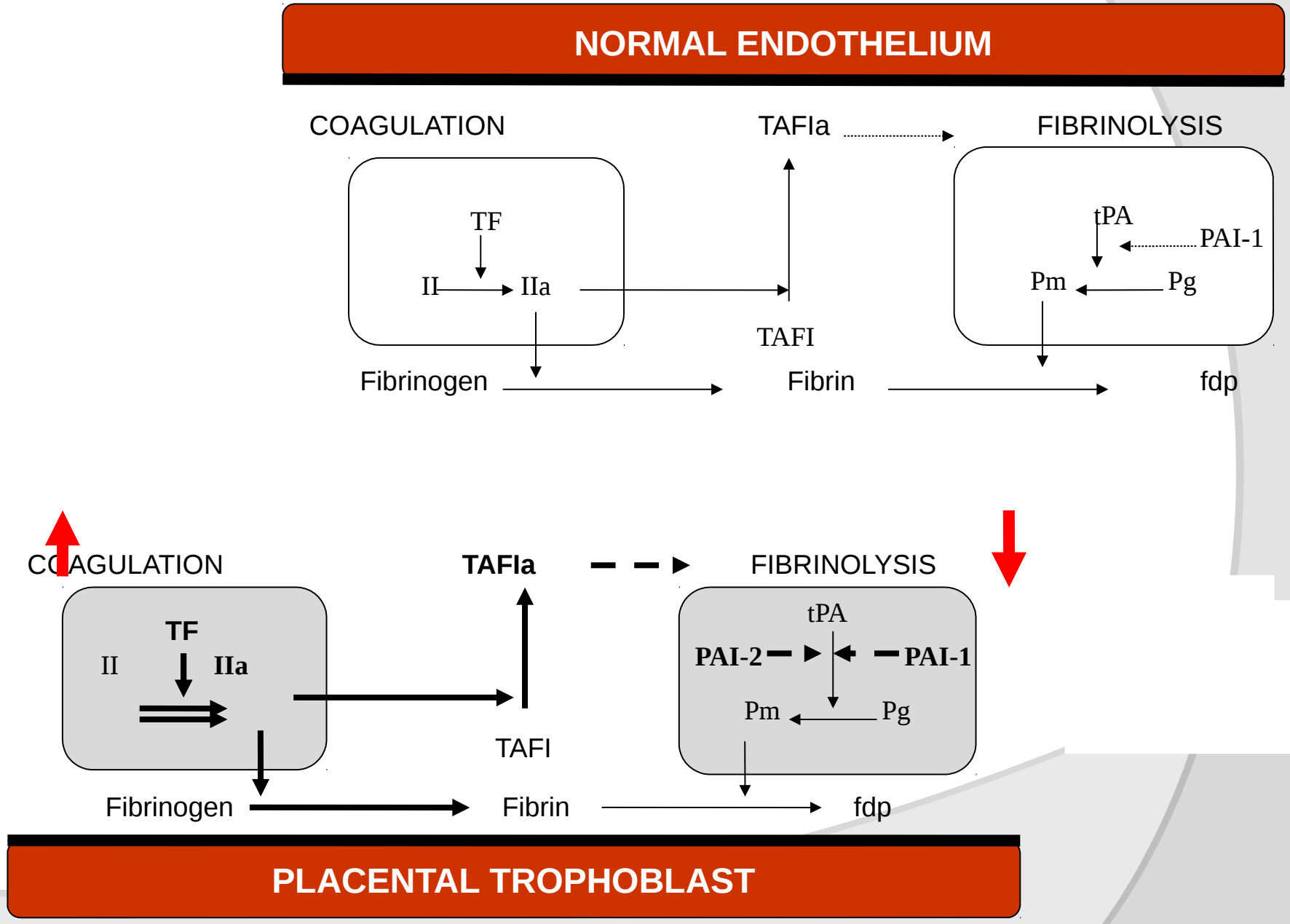
Recommendation 14 We recommend that fluid therapy be initiated in the hypotensive bleeding trauma patient. (Grade 1A)

We recommend that crystalloids be applied initially to treat the hypotensive bleeding trauma patient. (Grade 1B)

Antifibrinolytic agents

Recommendation 24 We recommend that tranexamic acid be administered as early as possible to the trauma patient who is bleeding or at risk of significant hemorrhage at a loading dose of 1 g infused over 10 minutes, followed by an intravenous infusion of 1 g over 8 h. (Grade 1A)




NORMAL ENDOTHELIUM
COAGULATION
TAFIa
FIBRINOLYSIS
TF
II
IIa
TAFI
tPA
PAI-1
Pm
Pg
Fibrinogen
Fibrin
fdp
COAGULATION
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IIa
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PAI-2
PAI-1
Pm
Pg
Fibrinogen
Fibrin
fdp
PLACENTAL TROPHOBLAST

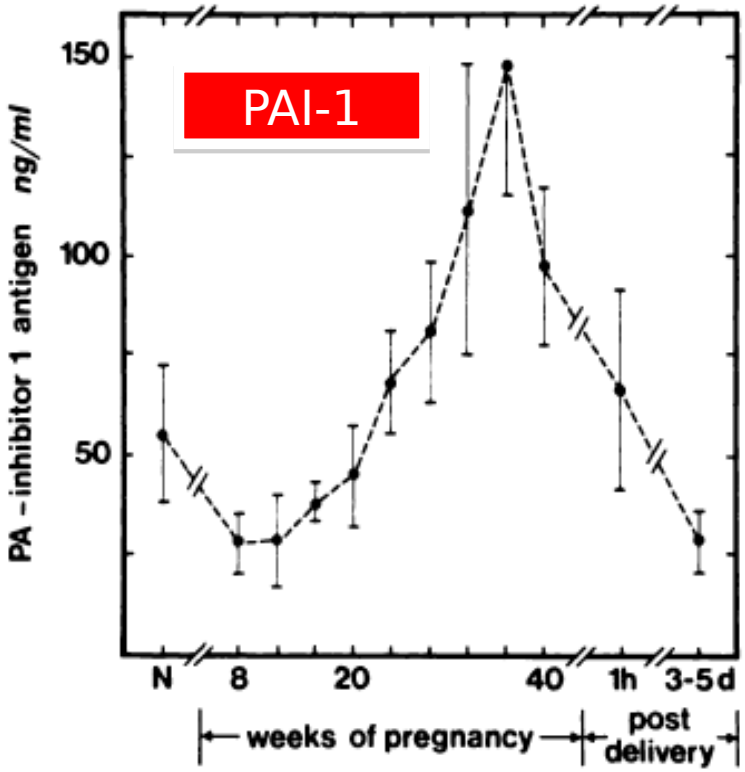
HEMOSTATIC CHANGES IN PREGNANCY

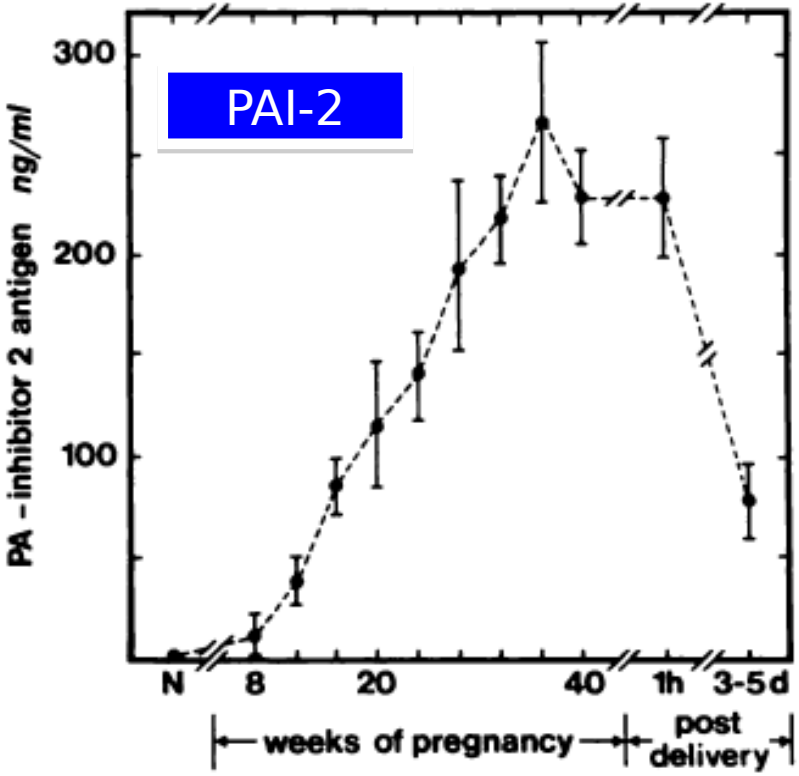
Variables (mean ± SD)	First tri*	Second tri*	Third tri*	Normal range
Platelet ($\times 10^9$ 1^{-1})	275 ± 64	256 ± 49	244 ± 52	150–400
Fibrinogen (g/L)	3.7 ± 0.6	4.4 ± 1.2	5.4 ± 0.8	2.1–4.2
Prothrombin complex (%)	120 ± 27	140 ± 27	130 ± 27	70–30
Antithrombin (U/mL)	1.02 ± 0.10	1.07 ± 0.14	1.07 ± 0.11	0.85–1.25
Protein C (U/mL)	0.92 ± 0.13	1.06 ± 0.17	.94 ± 0.2	0.68–1.25
Protein S, total (U/mL)	0.83 ± 0.11	0.73 ± 0.11	0.77 ± 0.10	0.70–1.70
Protein S, free (U/mL)	0.26 ± 0.07	0.17 ± 0.04	0.14 ± 0.04	0.20–0.50
Soluble fibrin (nmol/L)	9.2 ± 8.6	11.8 ± 7.7	13.4 ± 5.2	<15
Thrombin–antithrombin (μg/L)	3.1 ± 1.4	5.9 ± 2.6	7.1 ± 2.4	<2.7
D-dimers (μg/L)	91 ± 24	128 ± 49	198 ± 59	<80
Plasminogen activator inhibitor-1 (AU/mL)	7.4 ± 4.9	14.9 ± 5.2	37.8 ± 19.4	<15
Plasminogen activator inhibitor-2 (μg/L)	31 ± 14	84 ± 16	160 ± 31	<5
Cardiolipin antibodies positive	2/25	2/25	3/23	0
Protein Z (μg mL^{-1})†	2.01 ± 0.76	1.47 ± 0.45	1.55 ± 0.48	
Protein S (%)†		34.4 ± 11.8	27.5 ± 8.4	

blood

Fibrinolysis in pregnancy: a study of plasminogen activator inhibitors

EK Kruithof, C Tran-Thang, A Gudinchet, J Hauert, G Nicoloso, C Genton, H Welti and F Bachmann





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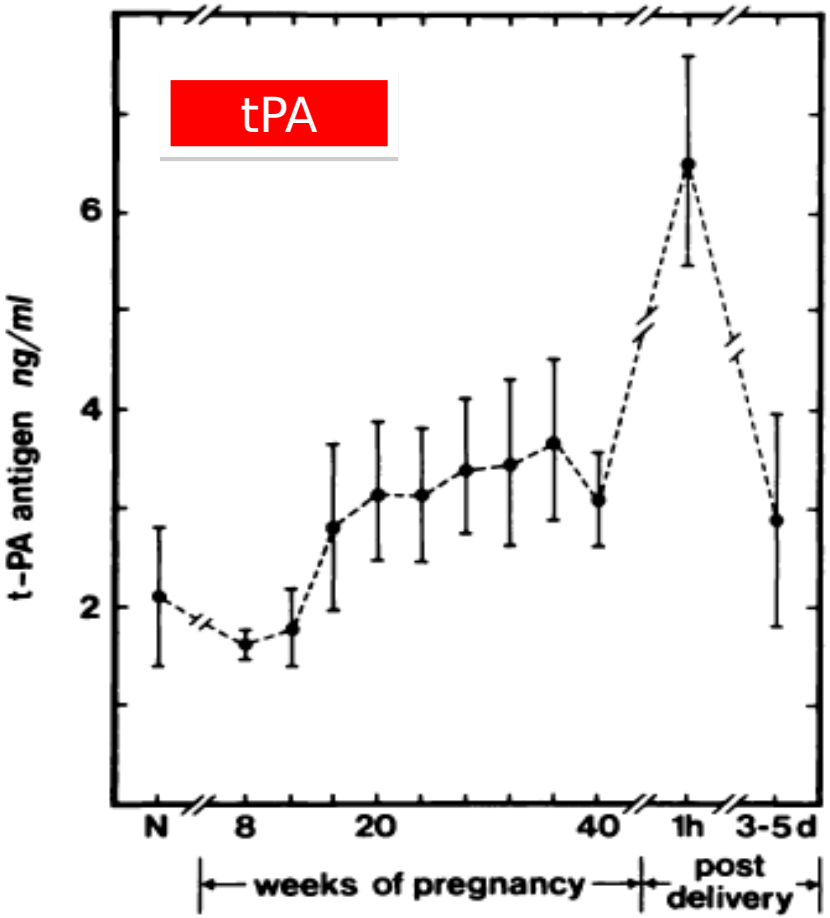

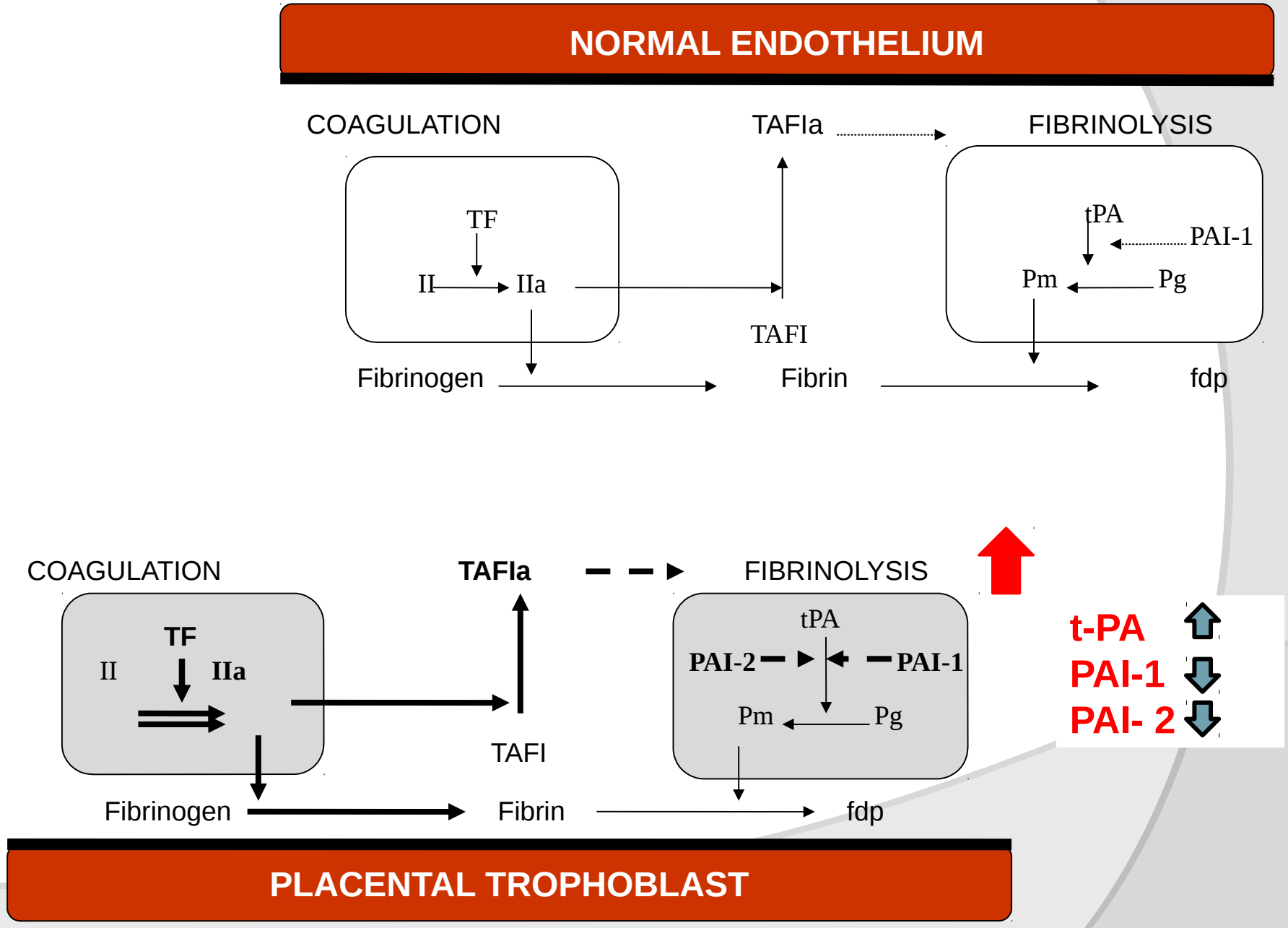
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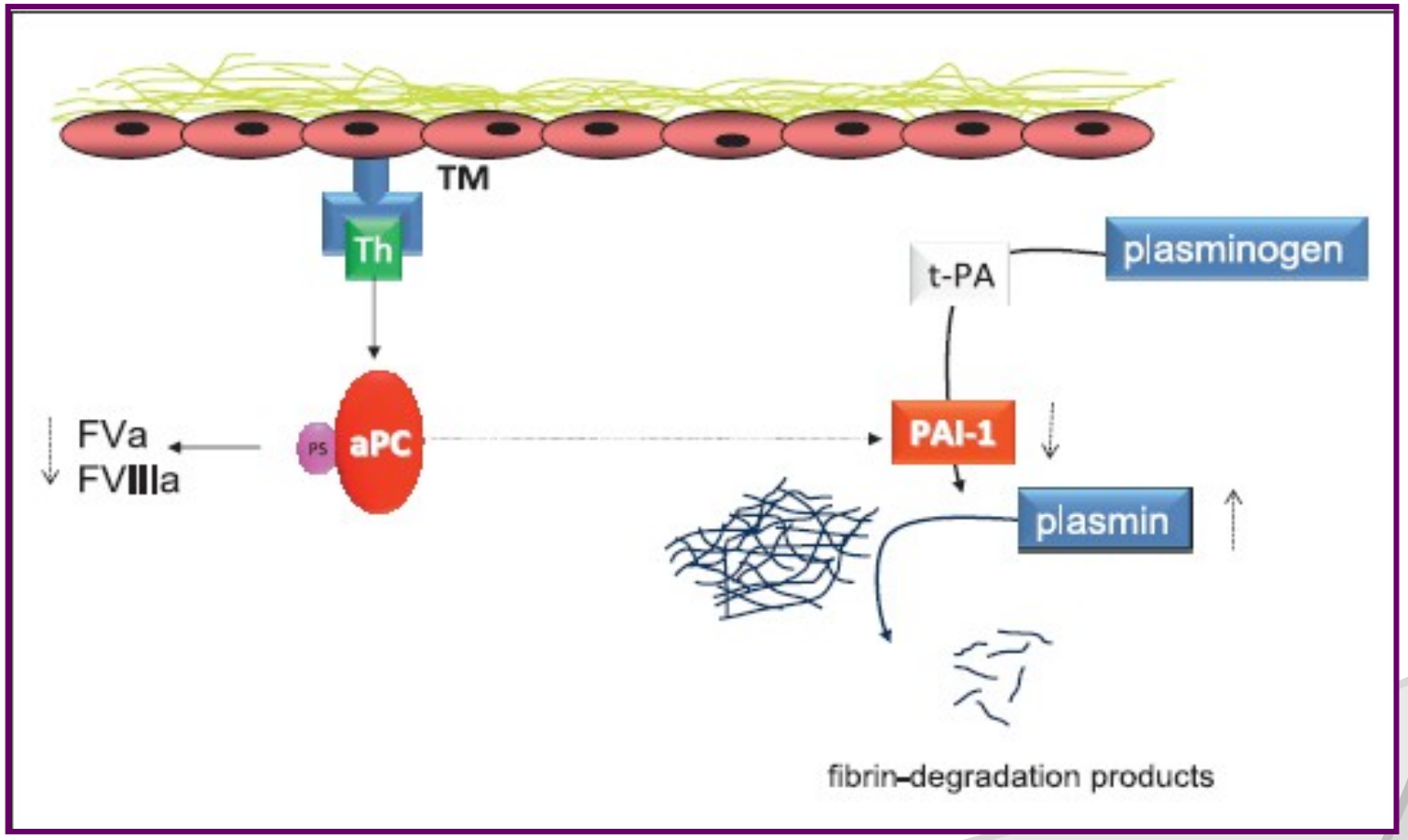
PAI- 2
PLACENTAL TROPHOBLAST

Shock - Ipoperfusione - Iperfibrinolisi



- ✓ **Tranexamic acid (1g/iv + 1g in 8h*): inhibits fibrinolysis, resulting in less bleeding***

Algoritmo A

Valutare perdite ematiche ed equilibrio emodinamico

PA
FC
FR
ECG
Pulsossimetria
T°C
Diuresi

10'-30'

Registrazione su schede grafiche

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≥ 500 ml (Parto spontaneo)
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Catetere vescicale
I° accesso venoso 16/14G

Prelievo basale

- **Emocromo**
- **PT**
- **PTT**
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- **ATIII**

TEST POC
(ove disponibile)

Prove crociate per richiesta urgentissima di emoderivati

II ° accesso venoso 16/14G:

- **Rimpiazzo volemico**
- **Acido Tranexanico ev. (1gr in bolo + 1gr in 8h)**
- **Evitare ipotermia, acidosi e desaturazione**

Arteria radiale: EGA (Lattati - BE) *emocromo e coagulazione*

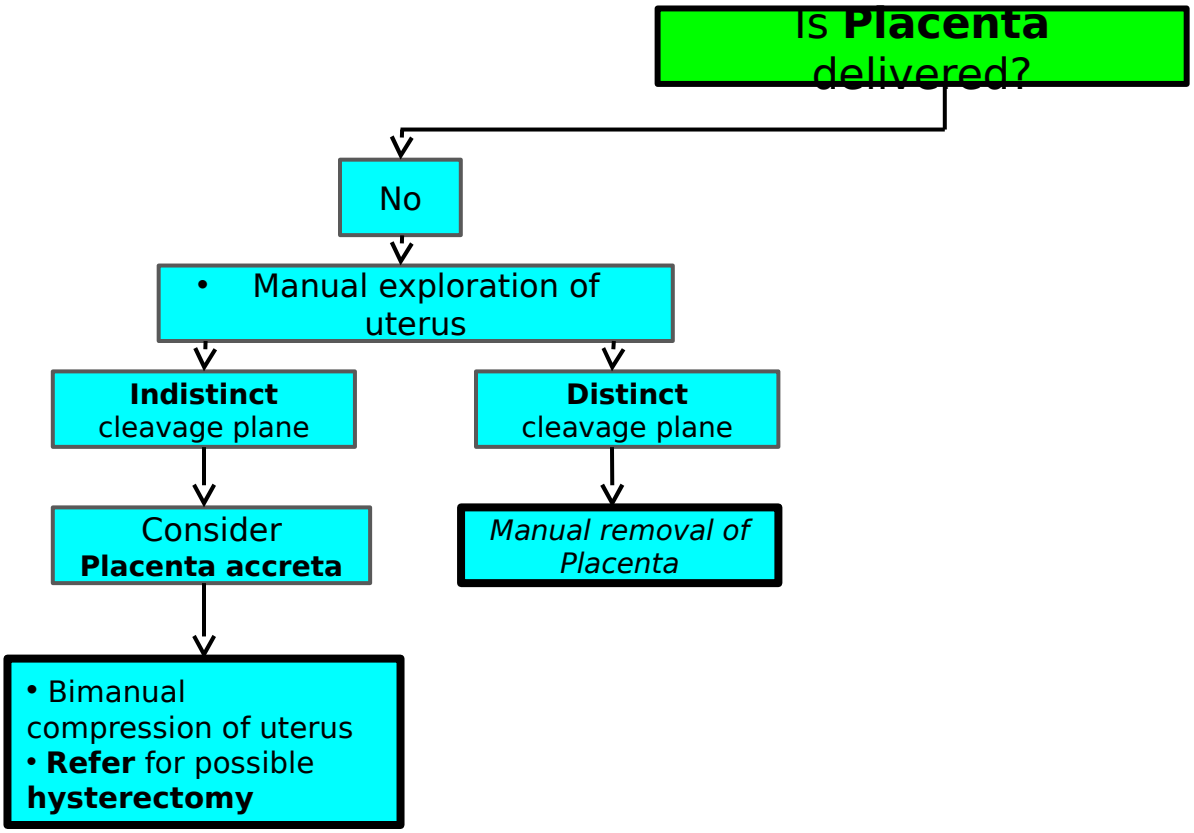
Richiesta di 4 U di GRC e Plasma a disposizione

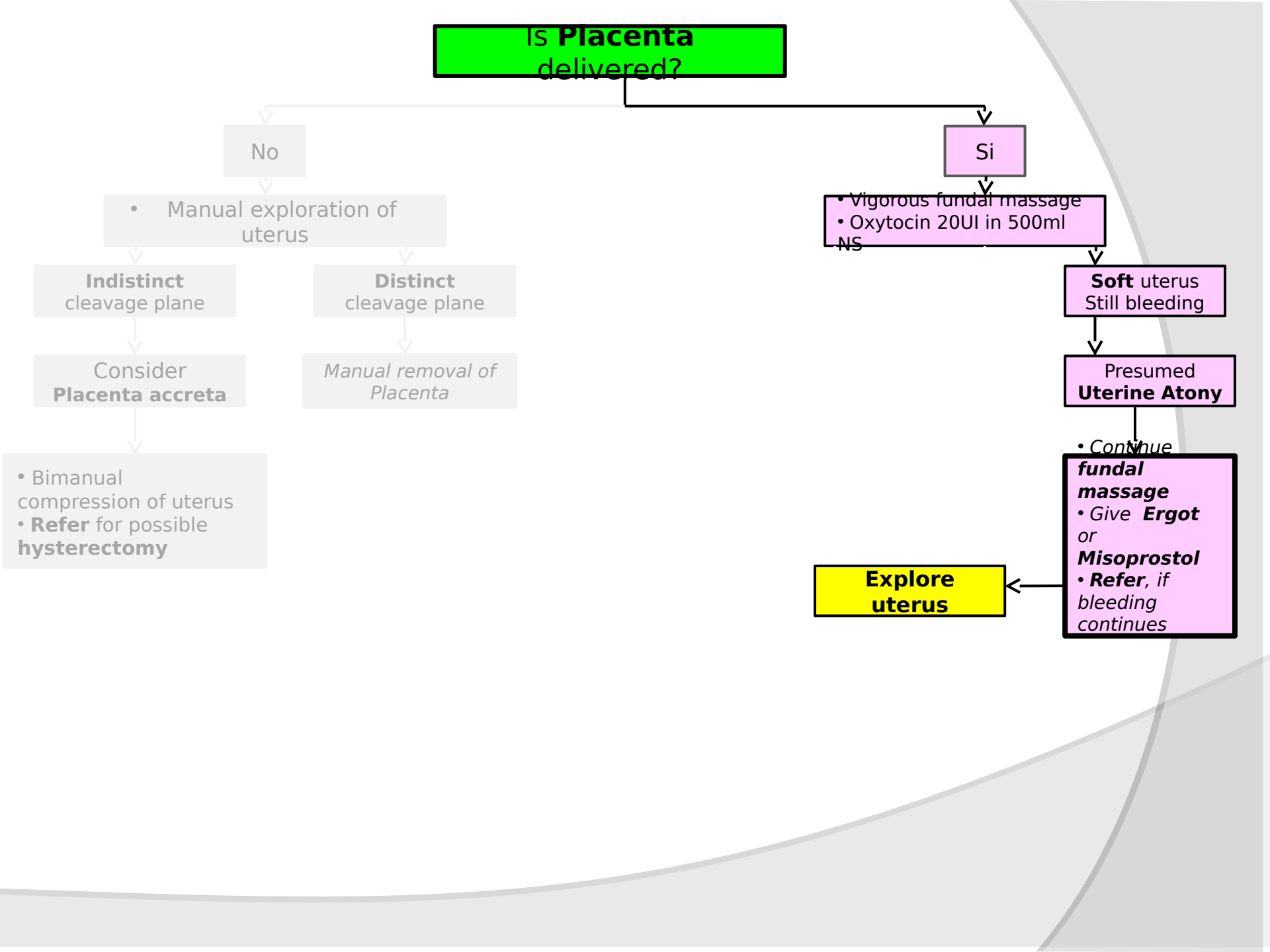
STABILIRE ORIGINE DEL SANGUINAMENTO ED ESEGUIRE INTERVENTI CORRETTIVI

“4 T”

Fattori di rischio per PPH

Tone (70%)	Trauma (20%)	Tissue (10%)	Coagulopathy (1%)
Prolonged labour	Operative delivery	Retained placental tissue	Pre-eclampsia
Precipitate labour	Cervical / vaginal lacerations	Abnormal placentation	HELLP Syndrome
Dysfunctional labour		Morbidly adherent placenta	Placental abruption
Grand Multiparity			Amniotic Fluid Embolism
Multiple pregnancy			Sepsis
Polyhydramnios			Bleeding disorders
Macrosomia			Drugs (aspirin / heparin)
Abnormalities: fibroids			
Intrauterine infection			
Uterine relaxing agents such as Magnesium sulphate / general anaesthetic/ tocolytics (terbutaline)			


Is **Placenta** delivered?
No
• Manual exploration of uterus
Indistinct cleavage plane
Distinct cleavage plane
Consider **Placenta accreta**
Manual removal of Placenta
• Bimanual compression of uterus
• **Refer** for possible **hysterectomy**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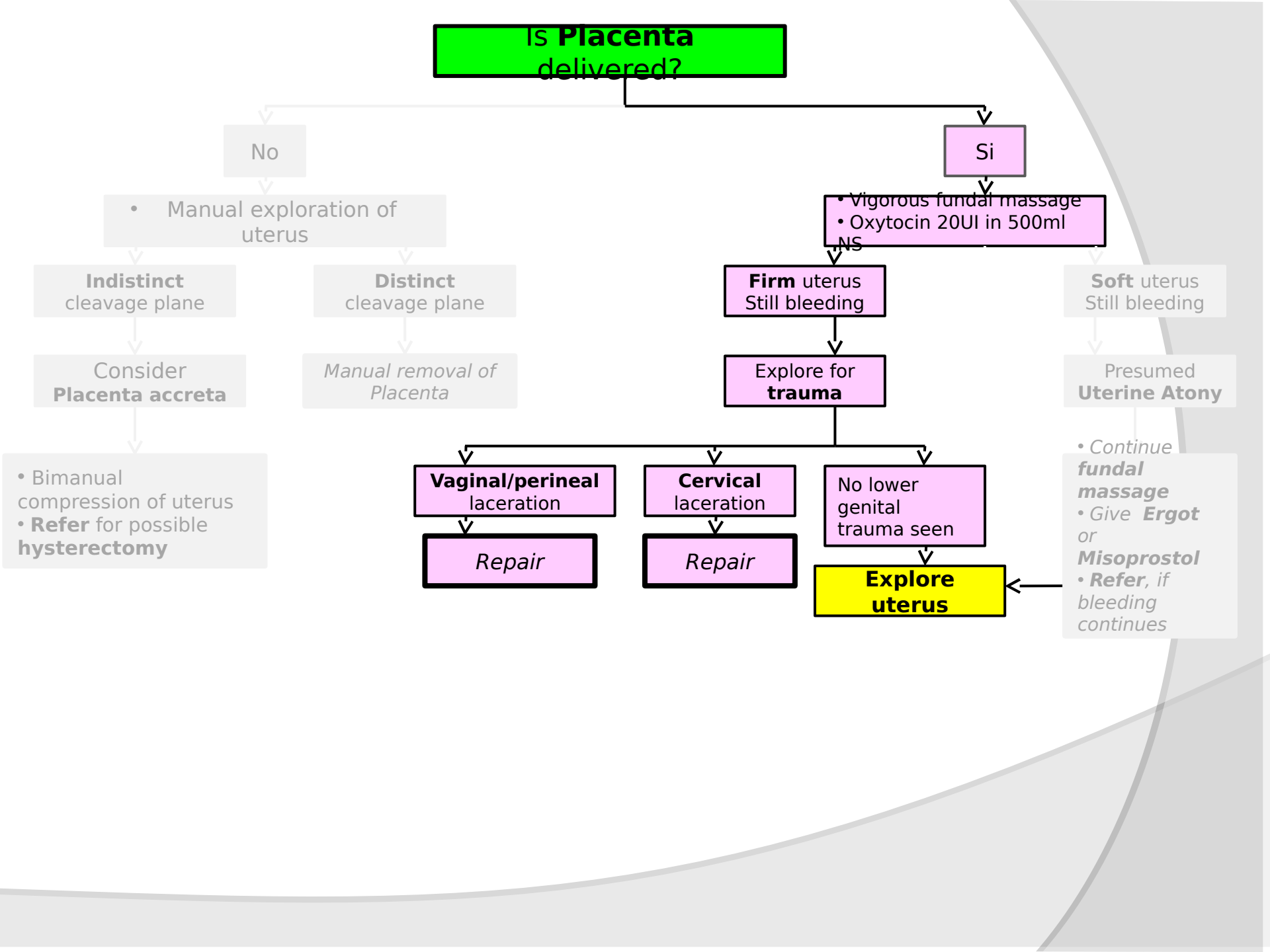
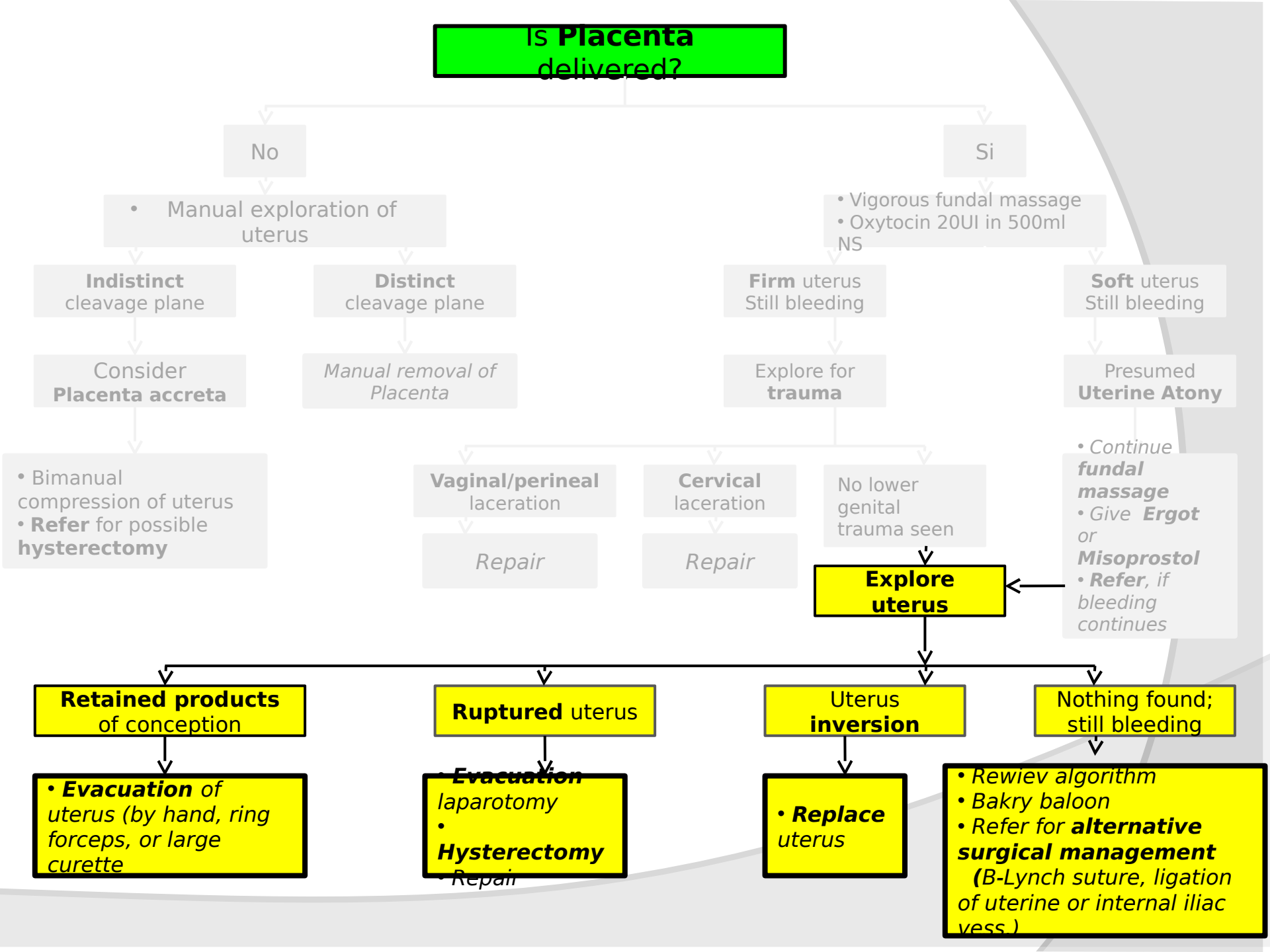
Distinct cleavage plane
Consider **Placenta accreta**
Manual removal of Placenta
• Bimanual compression of uterus
• **Refer** for possible **hysterectomy**
Si
• Vigorous fundal massage
• Oxytocin 20UI in 500ml NS
Soft uterus
Still bleeding
Presumed **Uterine Atony**
• *Continue* ***fundal massage***
• *Give* ***Ergot*** *or* ***Misoprostol***
• ***Refer****, if bleeding continues*
Explore uterus


Is **Placenta** delivered?
No
Si
• Manual exploration of uterus
• Vigorous fundal massage
• Oxytocin 20UI in 500ml NS
Indistinct cleavage plane
Distinct cleavage plane
Firm uterus Still bleeding
Soft uterus Still bleeding
Consider **Placenta accreta**
Manual removal of Placenta
Explore for **trauma**
Presumed **Uterine Atony**
• Bimanual compression of uterus
• **Refer** for possible **hysterectomy**
Vaginal/perineal laceration
Cervical laceration
No lower genital trauma seen
Repair
Repair
Explore uterus
• *Continue **fundal massage***
• *Give **Ergot** or **Misoprostol***
• ***Refer**, if bleeding continues*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Firm uterus Still bleeding
Soft uterus Still bleeding
Consider **Placenta accreta**
Manual removal of Placenta
Explore for **trauma**
Presumed **Uterine Atony**
• Bimanual compression of uterus
• **Refer** for possible **hysterectomy**
Vaginal/perineal laceration
Cervical laceration
No lower genital trauma seen
• *Continue **fundal massage***
• *Give **Ergot** or **Misoprostol***
• ***Refer**, if bleeding continues*
Repair
Repair
Explore uterus
Retained products of conception
Ruptured uterus
Uterus **inversion**
Nothing found; still bleeding
• ***Evacuation** of uterus (by hand, ring forceps, or large curette*
• ***Evacuation** laparotomy*
• ***Hysterectomy***
• *Repair*
• ***Replace** uterus*
• *Rewiev algorithm*
• *Bakry baloon*
• *Refer for **alternative surgical management** (B-Lynch suture, ligation of uterine or internal iliac vess.)*

Algoritmo A

TONO **TRAUMA**

TESSUTO ***TROMBINA***

MANCATA RISPOSTA

TERAPIA TRASFUSIONALE

E' disponibile Monitoraggio Point of Care (ROTEM/TEG)?

NO

TERAPIA TRASFUSIONALE MIRATA

Trasfondere GRC: Ht 21-27% Hb 7-9g/l

T°C> 34 pH > 7.2 Ca++ > 1.0mmol/L

Fibrinogenemia (Clauss o ROTEM/TEG) ≤200mg/dL:

- *concentrato di fibrinogeno 30-50mg/kg*
- *crioprecipitato 1U/10kg*
- *plasma fresco congelato 20-30ml/kg*

Fibrinogen and Hemostasis: A Primary Hemostatic Target for the Management of Acquired Bleeding

Jerrold H. Levy, MD, FAHA, Fania Szlam, MMSc, Kenichi A. Tanaka, MD, and Roman M. Sniecienski, MD

Table 1. A Comparison of the Constituent Components of the Transfusion Options for Fibrinogen Supplementation

			Fibrinogen concentrates	
Coagulation factor	FFP, relative content (%) in comparison with normal plasma[28,34]	Cryoprecipitate, relative content (%) in comparison with normal plasma: per single donor unit (20–50 mL)[38]	Riastap™[d]/ Haemocomplettan P/HS®[e] (per 50-mL vial) (CSL Behring, Marburg, Germany)	Clottafact®[f] (LFB-biomedicaments) (per 100-mL vial) (LFB-biomedicaments, Paris, France)
Fibrinogen	2.0 mg/mL (0.9–3.2)[34b]	388 mg[c] (range: 120–796 mg)	18–26 mg/mL	~15 mg/mL
FII	90 (72–108)[34b]	—	—	—
FV	88 (72–108)[34b]	—	—	—
FVII	90 (59–120)[34b]	—	—	—
FVIII	53 (32–92)[34b]	—	—	—
FIX	68 (45–87)[34b]	—	—	—
FX	88 (72–108)[34b]	—	—	—
FXI	100[28]	—	—	—
FXII	83[28]	—	—	—
FXIII	100[28]	20%–30%	—	—
Antithrombin III	100[28]	—	—	—
VWF	80[28c]	—	—	—
FVIII and VWF[a]	—	40%–70%	—	—
Fibronectin	—	20%–25%	—	—
IgG	—	5%–8%	—	—
IgM	—	1%–2%	—	—
Albumin	—	5%–8%	8–14 mg/mL	—
L-arginine	—	—	7.5–13.2 mg/mL	—
Sodium chloride	—	—	4–7 mg/mL	—
Sodium citrate	—	—	1–2 mg/mL	—

Algoritmo A

TONO TRAUMA
TESSUTO *TROMBINA*

→ MANCATA RISPOSTA

↓

TERAPIA TRASFUSIONALE
E' disponibile Monitoraggio Point of Care (ROTEM/TEG)?

si

Tromboelastometro -Tromboelastografo

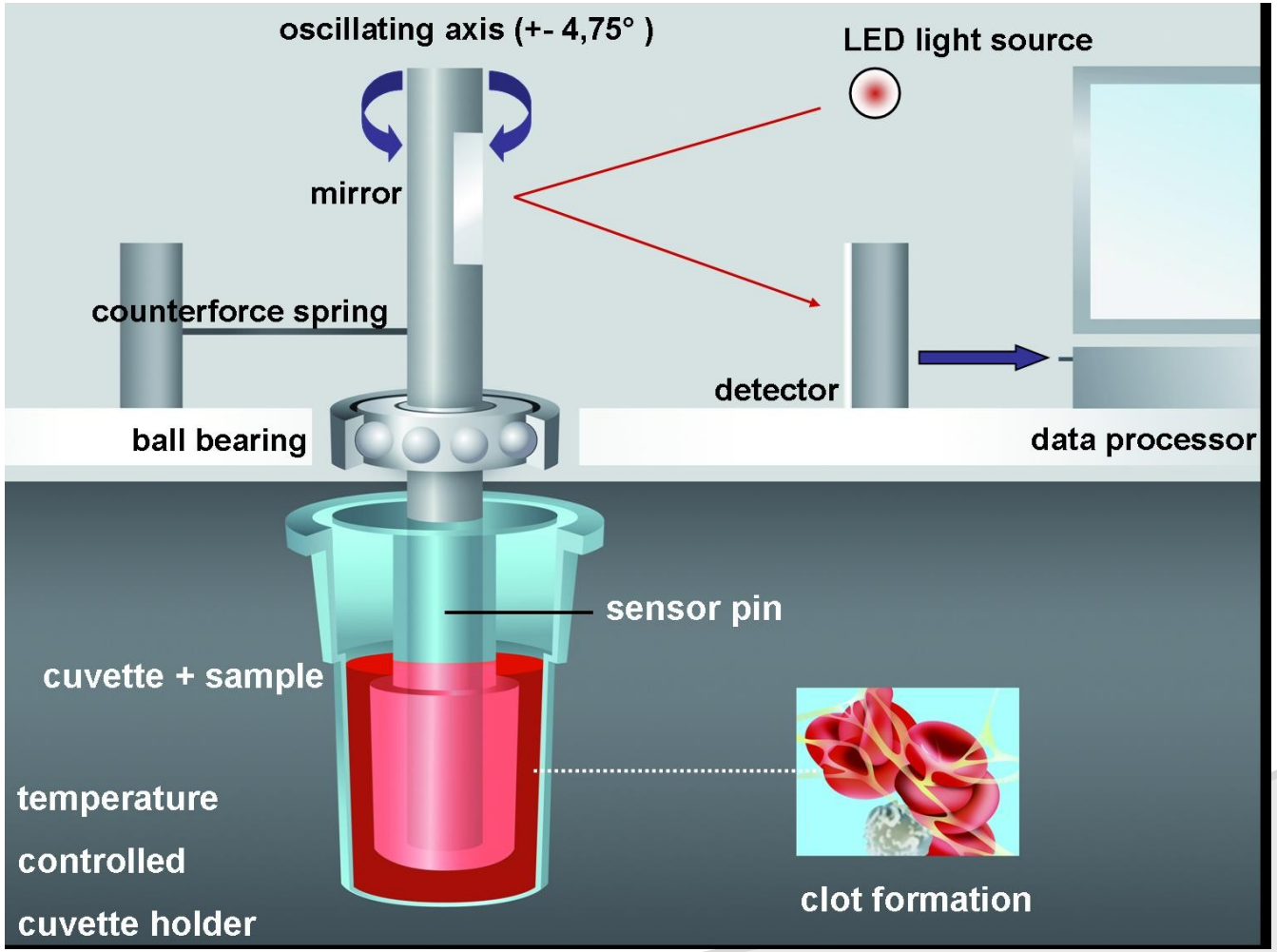
ROTEM®

- 4 channel instrument
- Automated pipetting
- Control unit integrated
- Sensitivity to vibration → NO
  (suitable for use on trolley table

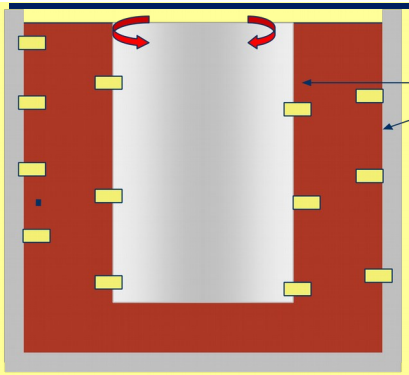
TEG®

- 2 channel instrument
- Manual pipetting
- Control Software on separate PC
- Sensitivity to vibration → YES
  (stable solid surfaces required)

Tromboelastometria



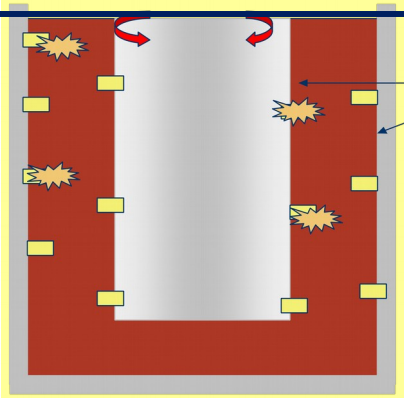
Tromboelastometria



Binding of fibrinogen to surface

Non physiological surface

1

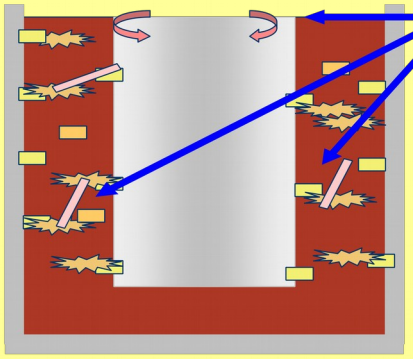


Coagulation Factors — Activator → Thrombin

Surface

Thrombocytes → Activated thrombocytes

2



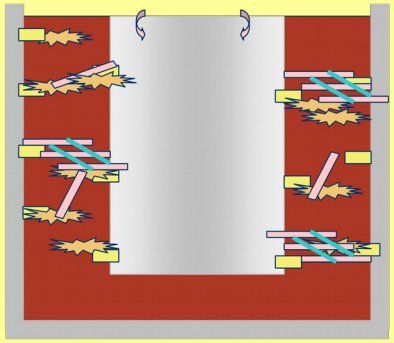
Restricted rotation

Thrombin

Fibrinogen → Soluble Fibrin

Unsoluble Fibrin

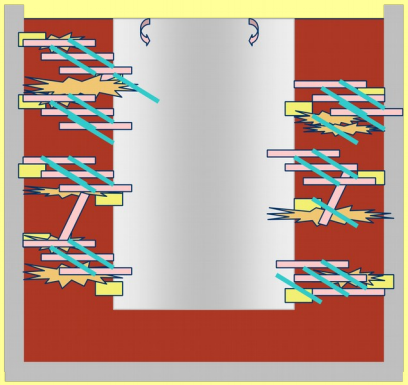
3



Thrombin → F XIII

Fibrin → **F XIIIa** → Fibrin, Cross linked

4

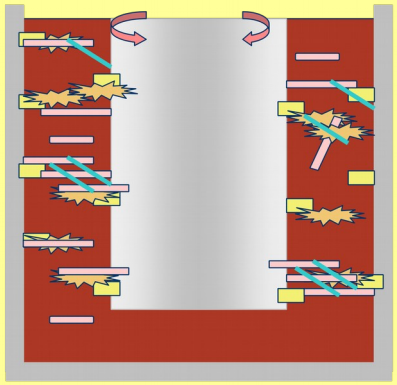


Thrombocyte retraction (myosin/ actin- system)

Crosslinking of thrombocytes und fibrin by F XIIIa

Massive solidification of the clot

5



Plasminogen activators

↓

Plasmin

↓

Fibrin → FDPs

↓

Onset of lysis

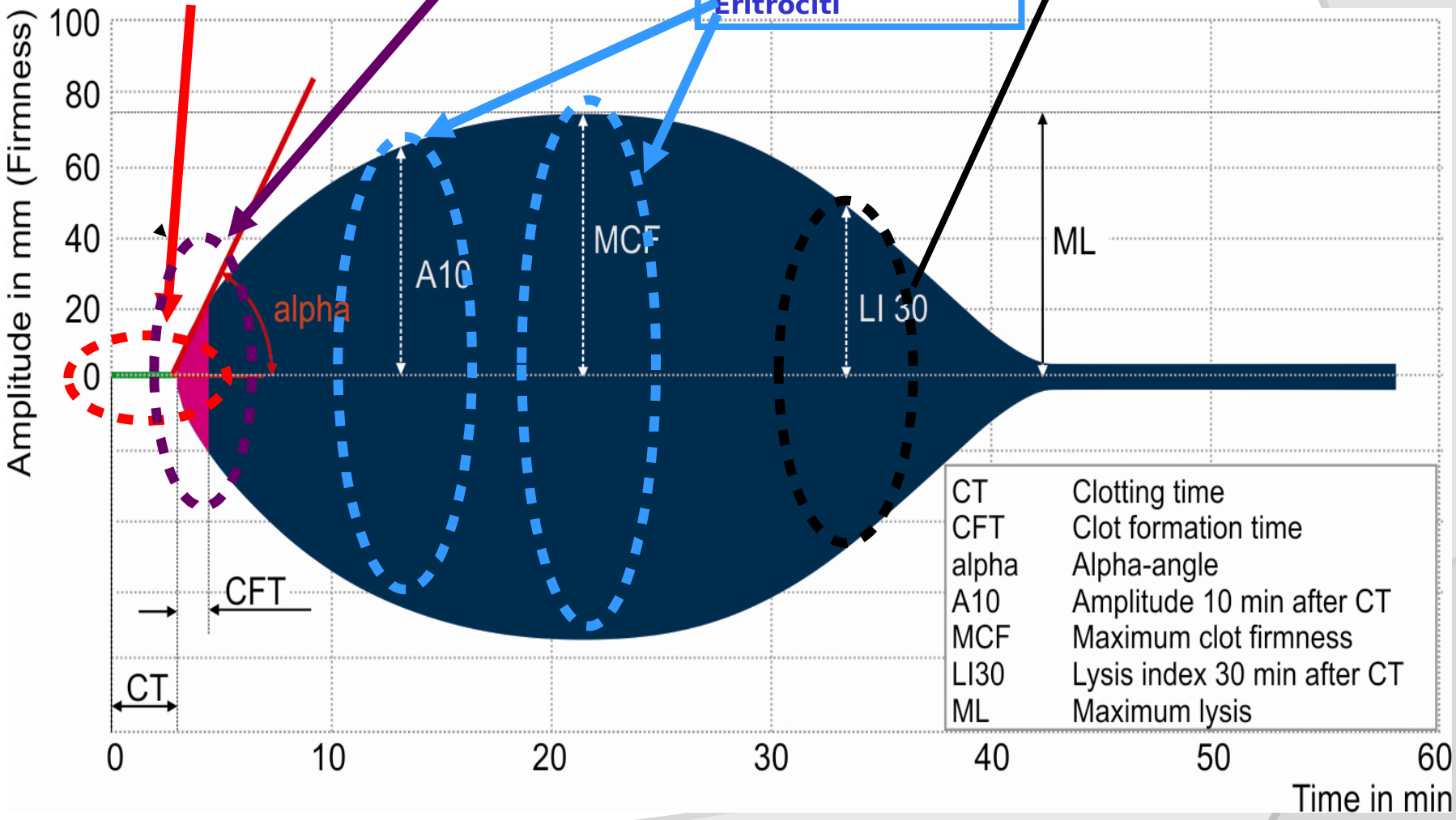
6

Fattori coag, cellule, Anticoagulanti,
Fibrinogeno

Piastrine

Piastrine
Fibrinogeno
F XIII
Leucociti
Eritrociti

Enzimi della fibrinolisi
Inibitori della fibrinoli



Algoritmo B

HPP emodinamicamente instabile

≥ 1000 ml

Classificazione dell'emorragia

American College of Surgeons -Committee on Trauma

	Class I	Class II	Class III	Class IV
blood loss (ml)	< 750	750 - 1500	1500 - 2000	> 2000
Blood loss (%)	15	15 - 30	30 – 40	> 40
Pulse rate (bpm)	<100	>100	<120	>140
Blood pressure	Normal	Decreased	Decreased	Decreased
Respiratory rate	14 - 20	20 -30	30- 40	> 35
Urine output (ml/H)	> 30	20 – 30	5 – 15	Negligible
CNS Sintoms	Normal	Anxious	Confused	Lethargic

Algoritmo B

SOMMINISTRARE OSSIGENO

HPP emodinamicamente instabile
> 1000 ml

Chiedere Aiuto (personale esperto)

Ginecologo
Ostetrica
Anestesista

Coinvolgere

Centro trasfusionale
Sala operatoria
Chirurgia vascolare
Radiologia interventistica

Algoritmo B

Valutare perdite ematiche ed equilibrio emodinamico

PA
FC
FR
ECG
Pulsossimetria
T°C
Diuresi

5'-10'

Registrazione su schede grafiche

HPP emodinamicamente instabile
≥ 1000 ml

Uterotonici: Ossitocina 20UI/500ml fisiologica/2h

Catetere vescicale
I° accesso venoso 16/14G

Prelievo basale

Emocromo
PT
PTT
Fibrinogeno (Clauss)
ATIII

TEST POC
(ove disponibile)

Prove crociate per richiesta urgentissima di emoderivati

Richiesta di 4 U di GRC
0 Rh negativo/positivo

Algoritmo B

HPP emodinamicamente instabile
> 1000 ml

Chiedere Aiuto (personale esperto)

Ginecologo
Ostetrica
Anestesista

Allertare

Centro trasfusionale
Sala operatoria
Chirurgia vascolare
Radiologia interventistica

UILIZZARE RISCALDATORI ED INFUSORI RAPIDI

Se velocità infusione > 50ml/kg/h

II ° accesso venoso 16/14G:

- **Rimpiazzo volemico**
- **Acido Tranexanico ev. (1gr in bolo + 1gr in 8h)**
- **Evitare ipotermia, acidosi e desaturazione**

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

CRITICAL CARE

RESEARCH Open Access

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

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

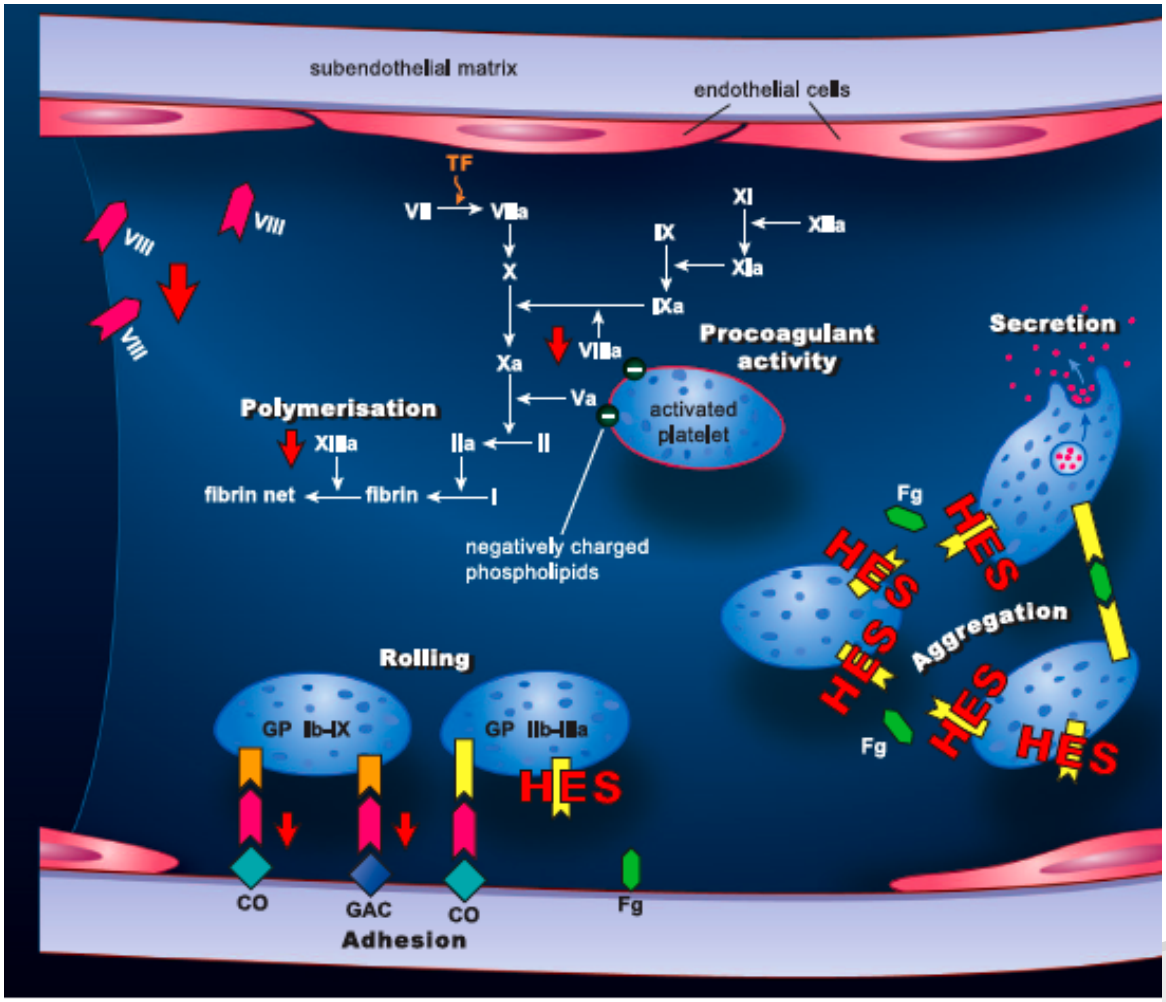
……..early and aggressive fluid administration to restore blood volume. This approach may, however, **increase the hydrostatic pressure on the wound**, **cause dislodgement of blood clots,** a **dilution of coagulation factors** and **undesirable cooling of the patient.**

The concept of low volume fluid resuscitation, so-called "**PERMISSIVE HYPOTENSION**", avoids the adverse effects of early aggressive resuscitation while maintaining a level of tissue perfusion that, although lower than normal, is adequate for short periods…….

Classificazione dell'emorragia

American College of Surgeons -Committee on Trauma

	Class I	Class II	Class III	Class IV
blood loss (ml)	< 750	750 - 1500	1500 - 2000	> 2000
Blood loss (%)	15	15 - 30	30 – 40	> 40
Pulse rate (bpm)	<100	>100	<120	>140
Blood pressure	Normal	Decreased	Decreased	Decreased
Respiratory rate	14 - 20	20 -30	30- 40	> 35
Urine output (ml/h)	> 30	20 – 30	5 – 15	Negligible
CNS Sintoms	Normal	Anxious	Confused	Lethargic
replacement	Crystalloid	Crystalloid	Crystalloid and blood	Crystalloid and blood



HES **decreases circulating factor VIII and von Willebrand factor (vWF) resulting in a hypocoagulable state at mild to moderate hemodilutions.**

HES **disturbs fibrin polymerization**

In addition, *HES* has inhibitory effects on platelet function (by reducing activity or reducing binding to the platelet fibrinogen receptor glycoprotein IIb–IIIa)

Colloidi

I prodotti contenenti HES devono essere utilizzati solo per il trattamento dell'ipovolemia causata da emorragia acuta quando i cristalloidi da soli non sono considerati sufficienti.

I prodotti contenenti HES devono essere utilizzati alla più bassa dose efficace per il più breve periodo di tempo. Il trattamento deve essere guidato da un monitoraggio emodinamico continuo, in modo da poter interrompere l'infusione non appena siano stati raggiunti adeguati valori emodinamici.

I prodotti contenenti HES sono ora controindicati nelle seguenti condizioni:

- Sepsi
- Ustioni
- Insufficienza renale o terapia renale sostitutiva
- Emorragia intracranica o cerebrale
- Pazienti critici (tipicamente ricoverati in Terapia Intensiva)
- Pazienti iperidratati, inclusi i pazienti con edema polmonare
- Pazienti disidratati
- Iperkaliemia (applicabile solo ai prodotti contenenti potassio)
- Grave iponatriemia o grave ipercloremia
- Coagulopatia grave
- Funzionalità epatica gravemente compromessa
- Insufficienza cardiaca congestizia
- Pazienti sottoposti a trapianto d'organo

Algoritmo B

HPP emodinamicamente instabile
> 1000 ml

Chiedere Aiuto (personale esperto)

Ginecologo
Ostetrica
Anestesista

Allertare

Centro trasfusionale
Sala operatoria
Chirurgia vascolare
Radiologia interventistica

UILIZZARE RISCALDATORI ED INFUSORI RAPIDI

Se velocità infusione > 50ml/kg/h

II ° accesso venoso 16/14G:

- **Rimpiazzo volemico**
- **Acido Tranexanico ev. (1gr in bolo + 1gr in 8h)**
- **Evitare ipotermia, acidosi e desaturazione**

Arteria radiale: EGA (Lattati - BE) *emocromo e coagulazione*

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

CRITICAL CARE

RESEARCH Open Access

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

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Serum lactate and base deficit

Recommendation 11 **We recommend either serum lactate or base deficit measurements as sensitive tests to estimate and monitor the extent of bleeding and shock. (Grade 1B)**

with traumatic-hemorrhagic shock [126]. Davis and colleagues [128] stratified the extent of base deficit into three categories: mild (-3 to -5 mEq/l), moderate (-6 to -9 mEq/l) and severe (<-10 mEq/l), and established a significant correlation between the admission base deficit, transfusion requirements within the first 24 h and the risk of post-traumatic organ failure or death [128]. The same group of authors showed that the base deficit is a better prognostic marker of death than the pH in arterial blood gas analyses [129]. Furthermore, the base deficit was shown to represent a highly sensitive marker for the extent of post-traumatic shock and mortality, both in adult and paediatric patients [130,131].

	Base Deficit
mild	-3 -5 mEq/l
moderate	-6 -9 mEq/l
severe	< -10 mEq/l

Algoritmo B

HPP emodinamicamente instabile
> 1000 ml

Chiedere Aiuto (personale esperto)

Ginecologo
Ostetrica
Anestesista

Allertare

Centro trasfusionale
Sala operatoria
Chirurgia vascolare
Radiologia interventistica

TERAPIA TRASFUSIONALE

GARANTIRE:

- Ematocrito >21%
- Temperatura >34°C
- pH >7.2
- Ca++ >1mmmol/L
- PA 80-90mmHg (ipotensione permissiva)

II ° accesso venoso 16/14G:

- **Rimpiazzo volemico**
- **Acido Tranexanico ev. (1gr in bolo + 1gr in 8h)**
- **Evitare ipotermia, acidosi e desaturazione**

Arteria radiale: EGA (Lattati - BE) *emocromo e coagulazione*

TERAPIA TRASFUSIONALE

E' disponibile Monitoraggio Point of Care (ROTEM/TEG)? NO

TERAPIA TRASFUSIONALE "ALLA CIECA"

In attesa dei risultati di laboratorio

- **4 GRC: 4U PFC oppure**
- **4 GRC: 2U PFC**
- **PLT ogni 8 GRC**

Se PTT o INR >1.5: PFC
(dose iniziale 20ml/kg fino a 30ml/kg per coagulopatia)

Correggere Fibrinogenemia

MANCATA RISPOSTA

PREVENIRE INSORGENZA DI DIC — **MANCATA RISPOSTA**

MANOVRE CHIRURGICHE CONSERVATIVE - RADIOLOGIA INTERVENTISTICA

TERAPIA TRASFUSIONALE

E' disponibile Monitoraggio Point of Care (ROTEM/TEG)? **NO**

TERAPIA TRASFUSIONALE "ALLA CIECA"
In attesa dei risultati di laboratorio

- 4 GRC: 4U PFC oppure
- 4 GRC: 2U PFC
- PLT ogni 8 GRC

Se PTT o INR >1.5: GRC e PFC
(dose iniziale 20ml/kg fino a 30ml/kg per coagulopatia)

Correggere Fibrinogenemia

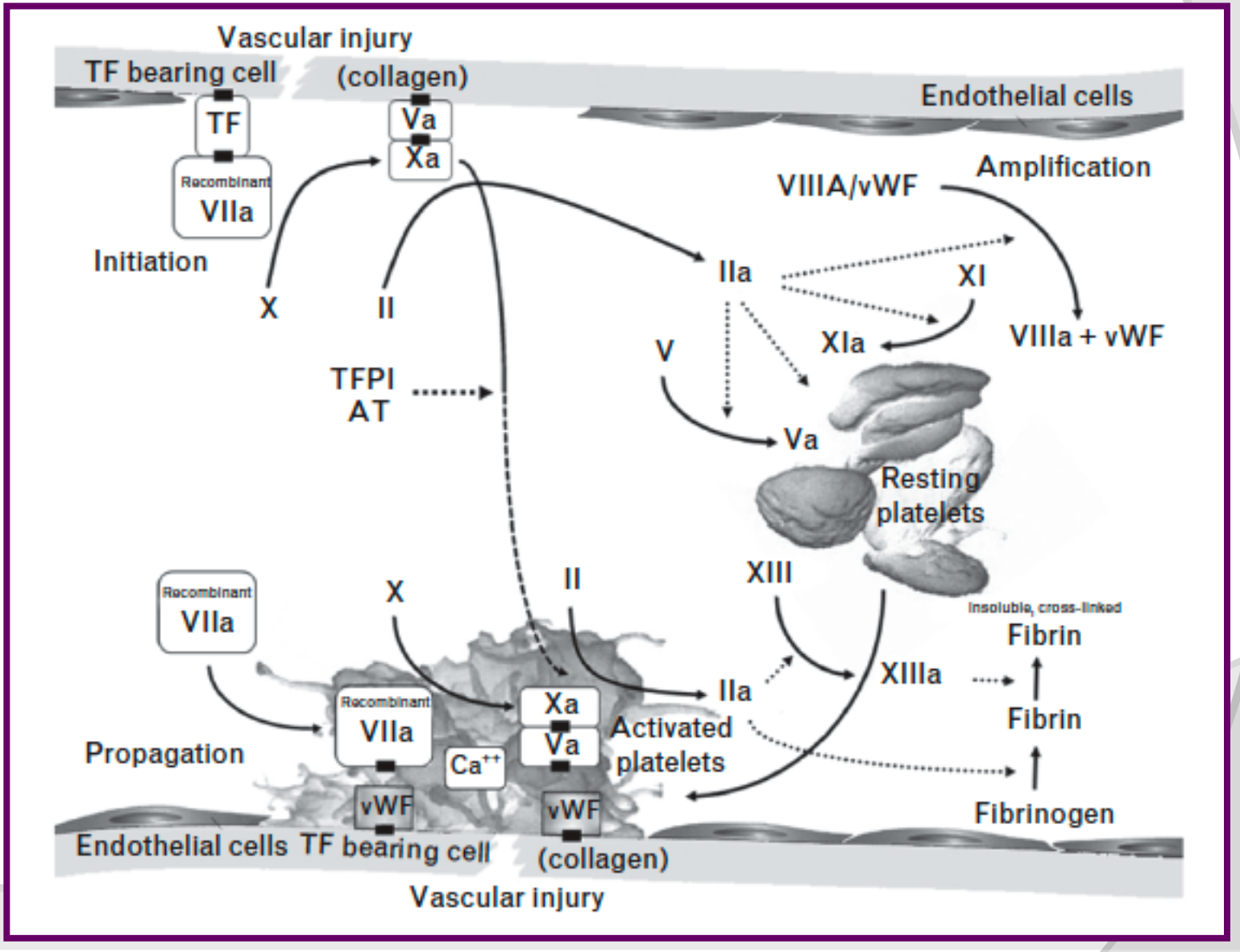
MANCATA RISPOSTA

PREVENIRE INSORGENZA DI DIC **MANCATA RISPOSTA**

MANOVRE CHIRURGICHE CONSERVATIVE
RADIOLOGIA INTERVENTISTICA **MANCATA RISPOSTA**

USO OF-LABEL di rFVIIa

The role of recombinant activated factor VII in obstetric hemorrhage



Our “Goal”

1. Transfuse RBCs to aim for a hemoglobin level of **7-9g/L**
2. Transfuse platelets to aim for a platelet count **≥ 70x10^{9}/L**
3. Transfuse FFP/fibrinogen/cryoprecipitate to aim for a fibrinogen level **more than 2g/L**
4. Transfuse FFP to aim for a PT and aPTT **less than 1.5** the upper normal range
5. Try to correct acidosis (**pH >7.2**) and hypothermia (**T°C >35**)
6. Correct low ionized calcium (**>1mmol/L**)

Levy JH. et al. How I use fibrinogen replacement therapy in acquired bleeding. Blood 2015;125:1387-1393

TERAPIA TRASFUSIONALE

E' disponibile Monitoraggio Point of Care (ROTEM/TEG)? **NO**

TERAPIA TRASFUSIONALE "ALLA CIECA"
In attesa dei risultati di laboratorio

- 4 GRC: 4U PFC oppure
- 4 GRC: 2U PFC
- PLT ogni 8 GRC

Se PTT o INR >1.5: GRC e PFC
(dose iniziale 20ml/kg fino a 30ml/kg per coagulopatia)

Correggere Fibrinogenemia

MANCATA RISPOSTA

PREVENIRE INSORGENZA DI DIC — **MANCATA RISPOSTA**

MANOVRE CHIRURGICHE CONSERVATIVE
RADIOLOGIA INTERVENTISTICA — **MANCATA RISPOSTA**

USO OF-LABEL di rFVIIa — **ISTERECTOMIA SUB e/o TOTALE**

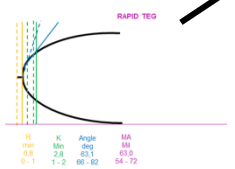
TERAPIA TRASFUSIONALE

E’ disponibile Monitoraggio Point of Care (ROTEM/TEG)? **SI**

TERAPIA TRASFUSIONALE

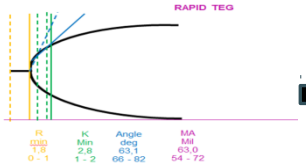
E' disponibile Monitoraggio Point of Care (ROTEM/TEG)?

SI



R

R: > 1

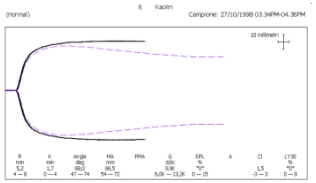


Carenza di Fattori della coagulazione

Plasma / Crioprecipitati

R: > 0 < 1

MA: > 54 < 72



Sanguinamento chirurgico

Chirurgo esperto

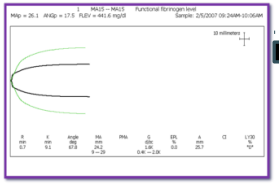
MA

MA: < 54

Fibrinogeno funzionale

MA

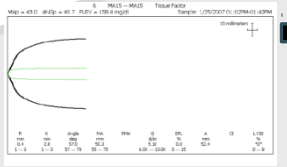
MA: > 9 < 29



Carenza di Piastrine

Piastrine

MA: < 9



Carenza di Fibrinogeno

Fibtinogeno


Grazie