La gestione della coagulazione in emergenza

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XI congresso nazionale
simeu

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Critical Care 2004, 8:373-381

Clinical review: Hemorrhagic shock

Cause più frequenti di sanguinamento acuto

Trauma

Sanguinamento gastrointestinale

Sanguinamento ostetrico/ginecologico

Rottura grossi vasi

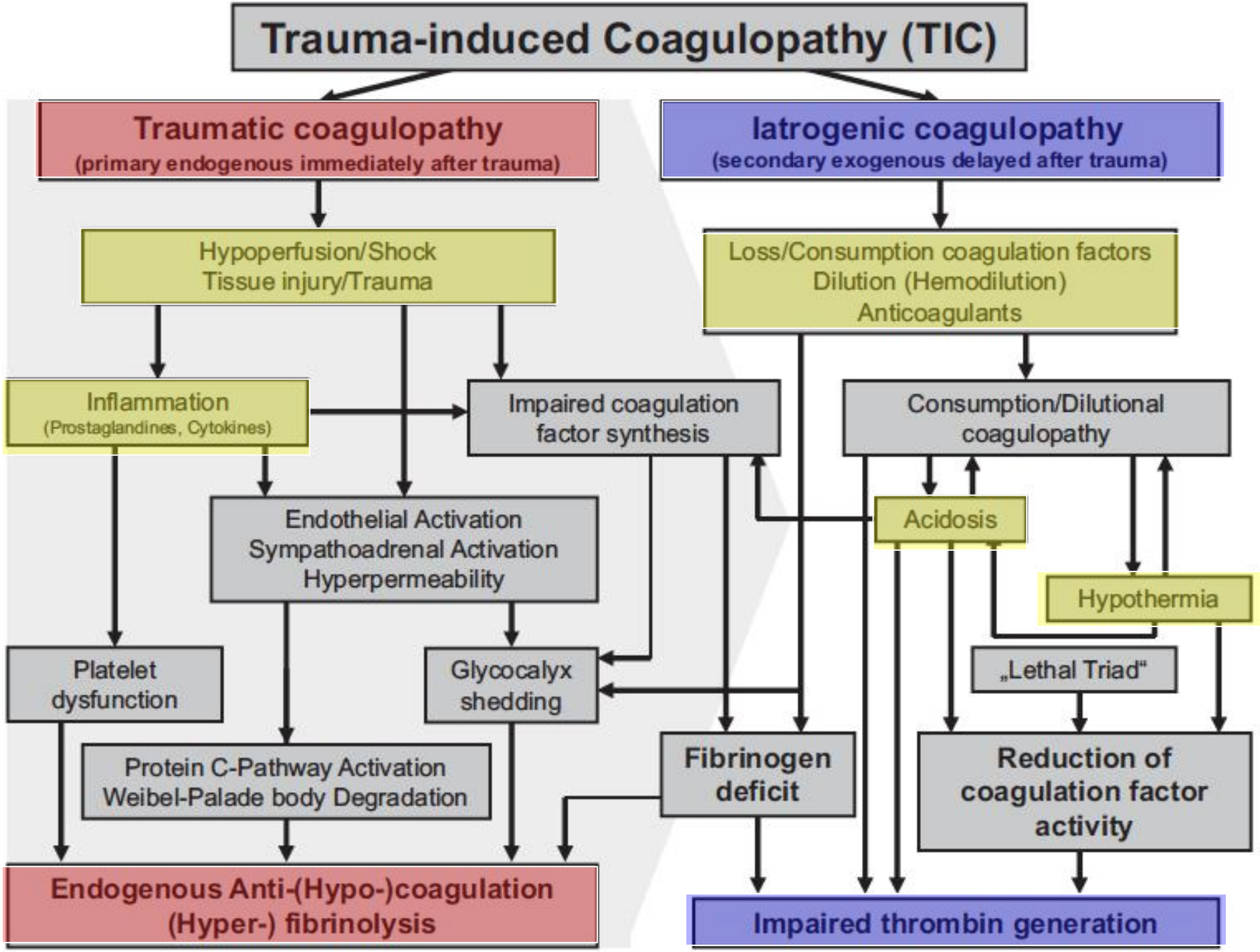
Guillermo Gutierrez

World J Surg (2007) 31: 1055–1064

Coagulopathy: Its Pathophysiology and Treatment in the Injured Patient

Bleeding

Brandon H. Tieu


Trauma-induced Coagulopathy (TIC)
Traumatic coagulopathy
(primary endogenous immediately after trauma)
Iatrogenic coagulopathy
(secondary exogenous delayed after trauma)
Hypoperfusion/Shock
Tissue injury/Trauma
Loss/Consumption coagulation factors
Dilution (Hemodilution)
Anticoagulants
Inflammation
(Prostaglandines, Cytokines)
Impaired coagulation factor synthesis
Consumption/Dilutional coagulopathy
Endothelial Activation
Sympathoadrenal Activation
Hyperpermeability
Acidosis
Hypothermia
Platelet dysfunction
Glycocalyx shedding
„Lethal Triad"
Protein C-Pathway Activation
Weibel-Palade body Degradation
Fibrinogen deficit
Reduction of coagulation factor activity
Endogenous Anti-(Hypo-)coagulation
(Hyper-) fibrinolysis
Impaired thrombin generation

Coagulopatia

The presence of a coagulopathy was defined as a PT over 18 seconds, APTT over 60 seconds, or TT over 15 seconds (1.5 times normal). These values are taken from the British National Blood Transfusion Service and the American College of Pathologists' guidelines and indicate a coagulopathy requiring blood product replacement therapy in the presence of active or impending hemorrhage.

K Brohi et al. J Trauma. 2003;54:1127–1130

stretta correlazione tra

gravità del trauma

entità del sanguinamento

necessità di trasfusioni massive

decesso

K Brohi et al. J Trauma. 2003;54:1127–1130

Critical Care 2004, 8:373-381

Clinical review: Hemorrhagic shock

shock emorragico

perdita rapida e significativa di volume ematico

instabilità emodinamica

riduzione della DO_2

riduzione della perfusione tissutale

ipossia cellulare

danno d'organo

decesso

Guillermo Gutierrez

Eur J Trauma Emerg Surg (2016) 42:273–282

Damage control resuscitation: lessons learned

DCR in trauma differs from traditional approaches by attempting an earlier and more aggressive correction of coagulopathy and metabolic derangements and prioritising haemorrhage control.

'Damage Control Resuscitation' (DCR)

M. Giannoudi

Critical Care 2004, 8:373-381

Clinical considerations in hemorrhagic shock

The therapeutic goals for hemorrhagic shock are to stop bleeding and to restore intravascular volume.

Fattori procoagulanti

Fattori procoagulanti

Emocomponenti

Fattori procoagulanti

Fattori procoagulanti

Emocomponenti

Reintegrazione volemica

Guillermo Gutierrez

Critical Care (2016) 20:100

The European guideline on management of major bleeding and coagulopathy following trauma: fourth edition

Coagulation monitoring

Recommendation 12 **We recommend that routine practice include the early and repeated monitoring of coagulation, using either a traditional laboratory determination [prothrombin time (PT), activated partial thromboplastin time (APTT) platelet counts and fibrinogen] (Grade 1A) and/or a viscoelastic method. (Grade 1C)**

Rolf Rossaint

The European guideline

traditional laboratory determination
prothrombin time (PT)
activated partial thromboplastin time (APTT)

these tests monitor only the initiation phase of blood coagulation, and represent only the first 4 % of thrombin production [178]. It is therefore possible that the conventional coagulation screen appears normal, while the overall state of blood coagulation is abnormal [13, 179–183]. In addition, the delay in detection of traumatic coagulopathy can influence outcome

The European guideline

complete and rapid monitoring of blood coagulation and fibrinolysis using viscoelastic methods may facilitate a more accurate targeting of therapy compared to conventional laboratory tests alone.

Critical Care (2016) 20:100

The European guideline

The "best guess" policy

'Damage Control Resuscitation' (DCR)

Initial coagulation resuscitation

Recommendation 24 **In the initial management of patients with expected massive haemorrhage, we recommend one of the two following strategies:**

- ✔ Plasma (FFP or pathogen-inactivated plasma) in a plasma–RBC ratio of at least 1:2 as needed. (Grade 1B)
- ✔ Fibrinogen concentrate and RBC according to Hb level. (Grade 1C)

Rolf Rossaint

Critical Care (2016) 20:100

The European guideline

Plasma (FFP or pathogen-inactivated plasma) in a plasma–RBC ratio of at least 1:2 as needed. (Grade 1B)

Fresh frozen plasma

Recommendation 27 **If a plasma-based coagulation resuscitation strategy is used, we recommend that plasma (FFP or pathogen-inactivated plasma) be administered to maintain PT and APTT <1.5 times the normal control. (Grade 1C)**

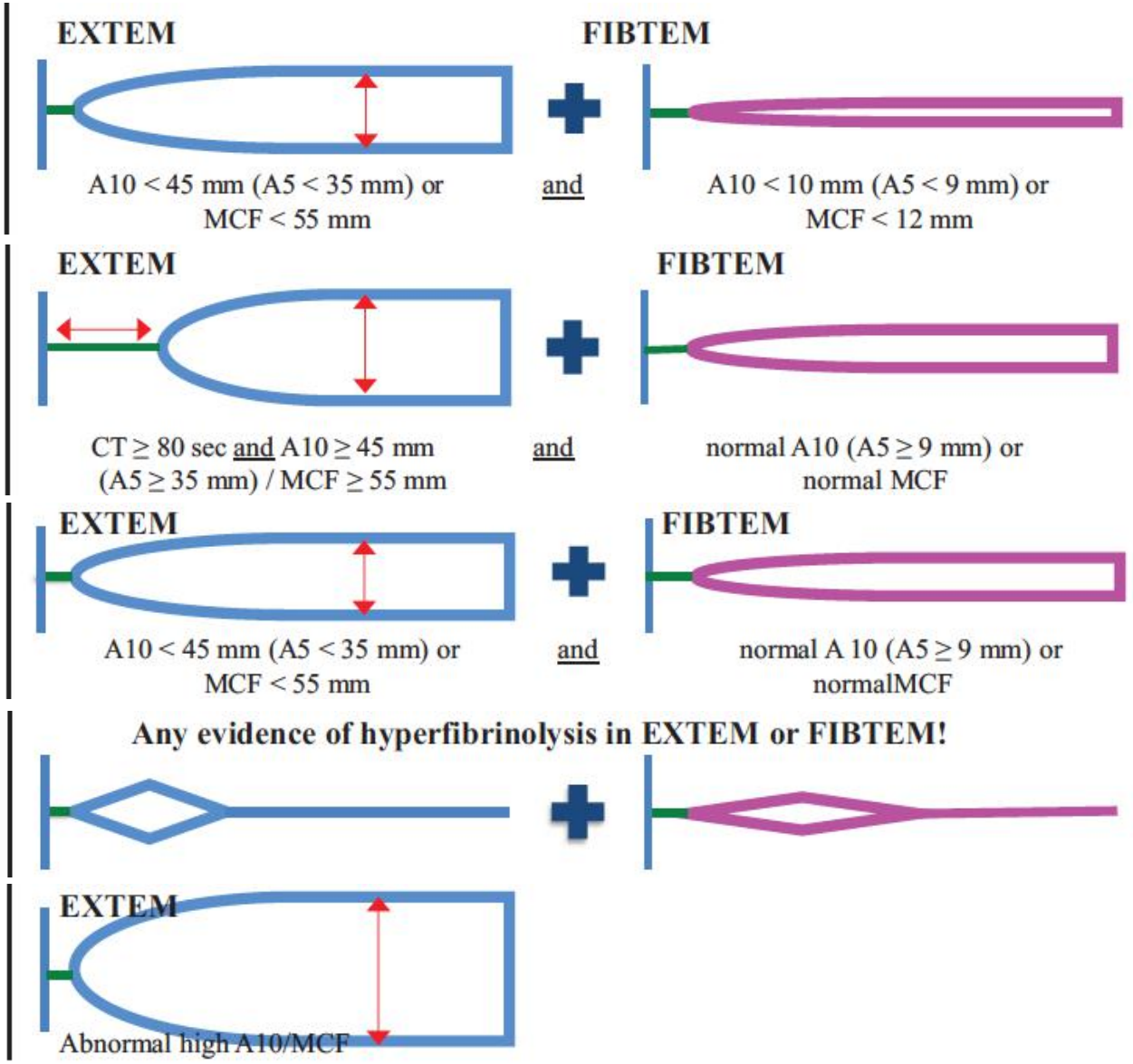
Fibrinogen concentrate and RBC according to Hb level. (Grade 1C)

Fibrinogen and cryoprecipitate

Recommendation 28 **If a concentrate-based strategy is used, we recommend treatment with fibrinogen concentrate or cryoprecipitate if significant bleeding is accompanied by viscoelastic signs of a functional fibrinogen deficit or a plasma fibrinogen level of less than 1.5–2.0 g/l. (Grade 1C)**

ROTEM-based algorithm for the use of hemostatic agents and blood products during early trauma care

'Goal-directed Coagulation Therapy' (GDCT)



Critical Care (2016) 20:100

The European guideline

Antifibrinolytic agents

Recommendation 25 **We recommend that tranexamic acid be administered as early as possible to the trauma patient who is bleeding or at risk of significant haemorrhage at a loading dose of 1 g infused over 10 min, followed by an i.v. infusion of 1 g over 8 h. (Grade 1A)**

Critical Care (2016) 20:100

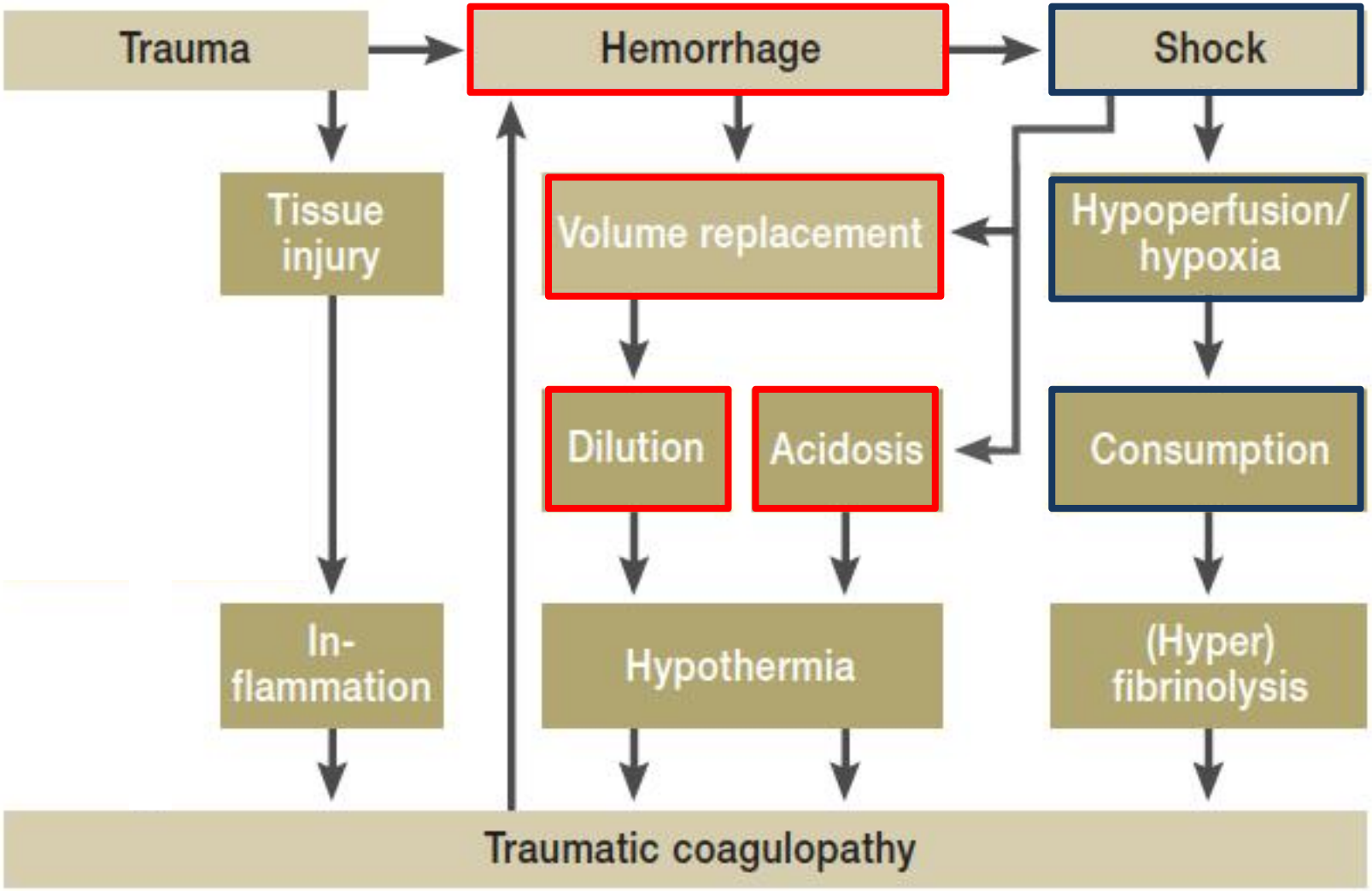
The European guideline

Platelets

Recommendation 29 **We recommend that platelets be administered to maintain a platelet count above 50×10^9/l. (Grade 1C)**

We suggest maintenance of a platelet count above 100×10^9/l in patients with ongoing bleeding and/or TBI. (Grade 2C)

TBI: traumatic brain injury


Trauma
Hemorrhage
Shock
Tissue injury
Volume replacement
Hypoperfusion/ hypoxia
Dilution
Acidosis
Consumption
In- flammation
Hypothermia
(Hyper) fibrinolysis
Traumatic coagulopathy

J Thorac Cardiovasc Surg 2011;142:662-7

Bleeding and management of coagulopathy

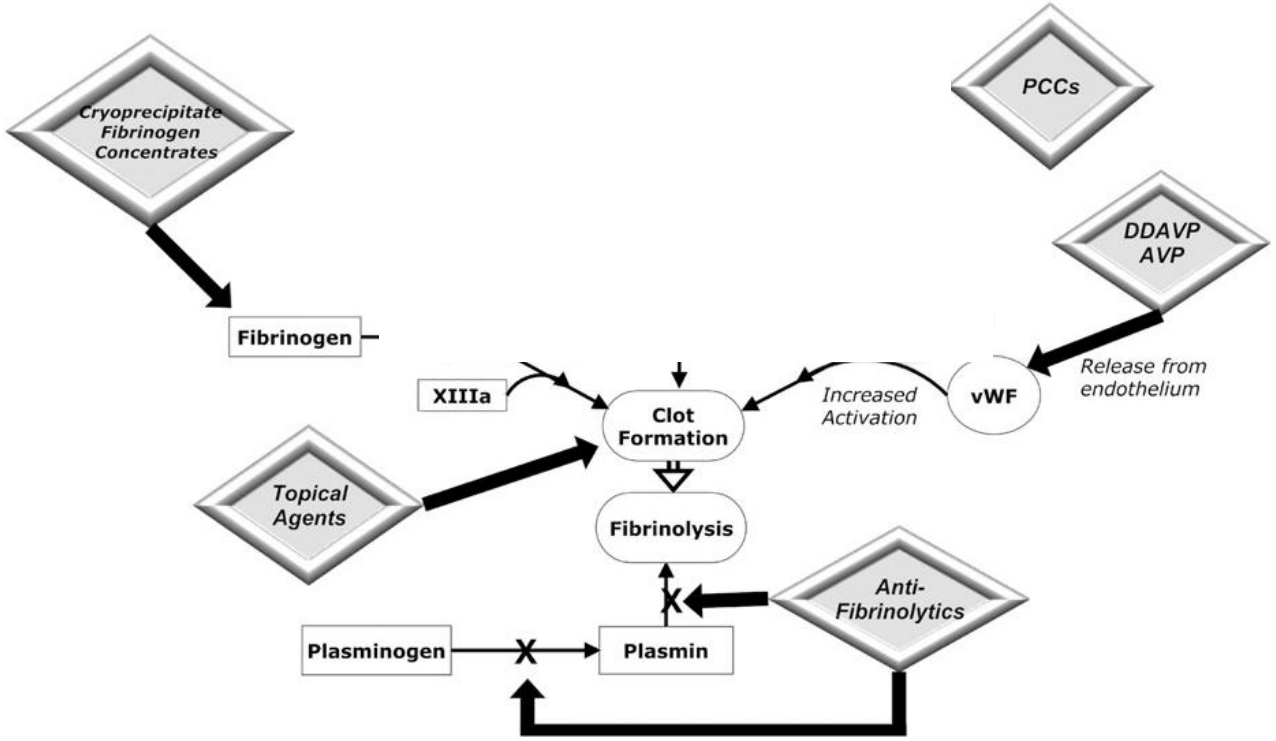


FIGURE 1. An overview of clot formation, demonstrating points of intervention.

Roman M. Sniecinski

Critical Care (2016) 20:100

The European guideline

Antiplatelet agents

Recommendation 31 **We suggest administration of platelets in patients with substantial bleeding or intracranial haemorrhage who have been treated with antiplatelet agents. (Grade 2C)**

Critical Care (2016) 20:100

The European guideline

Desmopressin

Recommendation 32 **We suggest that desmopressin (0.3 μg/kg) be administered in patients treated with platelet-inhibiting drugs or with von Willebrand disease. (Grade 2C)**

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The European guideline

Prothrombin complex concentrate

Recommendation 33 **We recommend the early use of prothrombin complex concentrate (PCC) for the emergency reversal of vitamin K-dependent oral anti-coagulants. (Grade 1A)**

PCCs 4F (or 3F) (20-30 IU/kg)
in case of bleeding in bleeding patients and
evidence of low activity of soluble coagulation factors
(INR > 1.5 and/or prolonged reaction/clotting time at VHA)
in bleeding patients

FFP transfusion (15–20 ml / kg^{-1}) only if PCC is not available

Critical Care (2016) 20:100

The European guideline

Direct oral anticoagulants – factor Xa inhibitors

conoscenza della farmacocinetica
orario dell'ultima assunzione
funzionalità renale

[Tempo di Trombina diluita- dTT]
[Test di attività specifica anti-fattore Xa]

Recommendation 34 **We suggest the measurement of plasma levels of oral anti-factor Xa agents such as rivaroxaban, apixaban or edoxaban in patients treated or suspected of being treated with one of these agents. (Grade 2C)**

Direct oral anticoagulants – thrombin inhibitors

Recommendation 35 **We suggest the measurement of dabigatran plasma levels in patients treated or suspected of being treated with dabigatran. (Grade 2C)**

If measurement is not possible or available, we suggest thrombin time and APTT to allow a qualitative estimation of the presence of dabigatran. (Grade 2C)

If bleeding is life-threatening, we recommend treatment with idarucizumab (5 g intravenously) (Grade 1B), or, if unavailable, we suggest treatment with high-dose (25–50 U/kg) PCC/aPCC, in both cases combined with TXA 15 mg/kg (or 1 g) intravenously. (Grade 2C)

Requisiti minimi per il monitoraggio dell'emostasi e della coagulazione

Ospedale con dipartimenti chirurgici

Monitoraggio standard con PT/INR , aPTT ,
conta piastrinica e concentrazione di fibrinogeno

Test Addizionali per misurazione dell'attività DOACs
[Tempo di Trombina diluita- dTT]
[Test di attività specifica anti-fattore Xa]
Non sono mandatori ma suggeriti

Requisiti minimi per il monitoraggio dell'emostasi e della coagulazione

Ospedale con chirurgia a rischio medio/alto di sanguinamento

Aggregometria (PFTs) è raccomandata

Test per valutazione emostatica viscoelastica [VHAs]
Point-of-care test

Posizionamento in Sala Operatoria o Terapia Intensiva

Se in laboratorio , disponibilità di staff addestrato
e a disposizione per interpretazione dei tests

Requisiti minimi per il monitoraggio dell'emostasi e della coagulazione

Ospedale con cardiochirurgia e cardiologia interventistica

Aggregometria (PFTs) è raccomandata

Test per valutazione emostatica viscoelastica [VHAs]
Point-of-care test

Requisiti minimi per il monitoraggio dell'emostasi e della coagulazione

Ospedale con Trauma Center

Test per valutazione emostatica viscoelastica [VHAs]
Point-of-care test

Aggregometria (PFTs) è raccomandata

Posizionamento in Pronto Soccorso

Se in laboratorio , disponibilità di staff addestrato
e a disposizione per interpretazione dei tests