Management léčby masivního krvácení u traumat

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Critical Care

RESEARCH Open Access

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

Rolf Rossaint[1], Bertil Bouillon[2], Vladimir Cerny[3,4,5,6], Timothy J. Coats[7], Jacques Duranteau[8], Enrique Fernández-Mondéjar[9], Daniela Filipescu[10], Beverley J. Hunt[11], Radko Komadina[12], Giuseppe Nardi[13], Edmund A. M. Neugebauer[14], Yves Ozier[15], Louis Riddez[16], Arthur Schultz[17], Jean-Louis Vincent[18] and Donat R. Spahn[19*]

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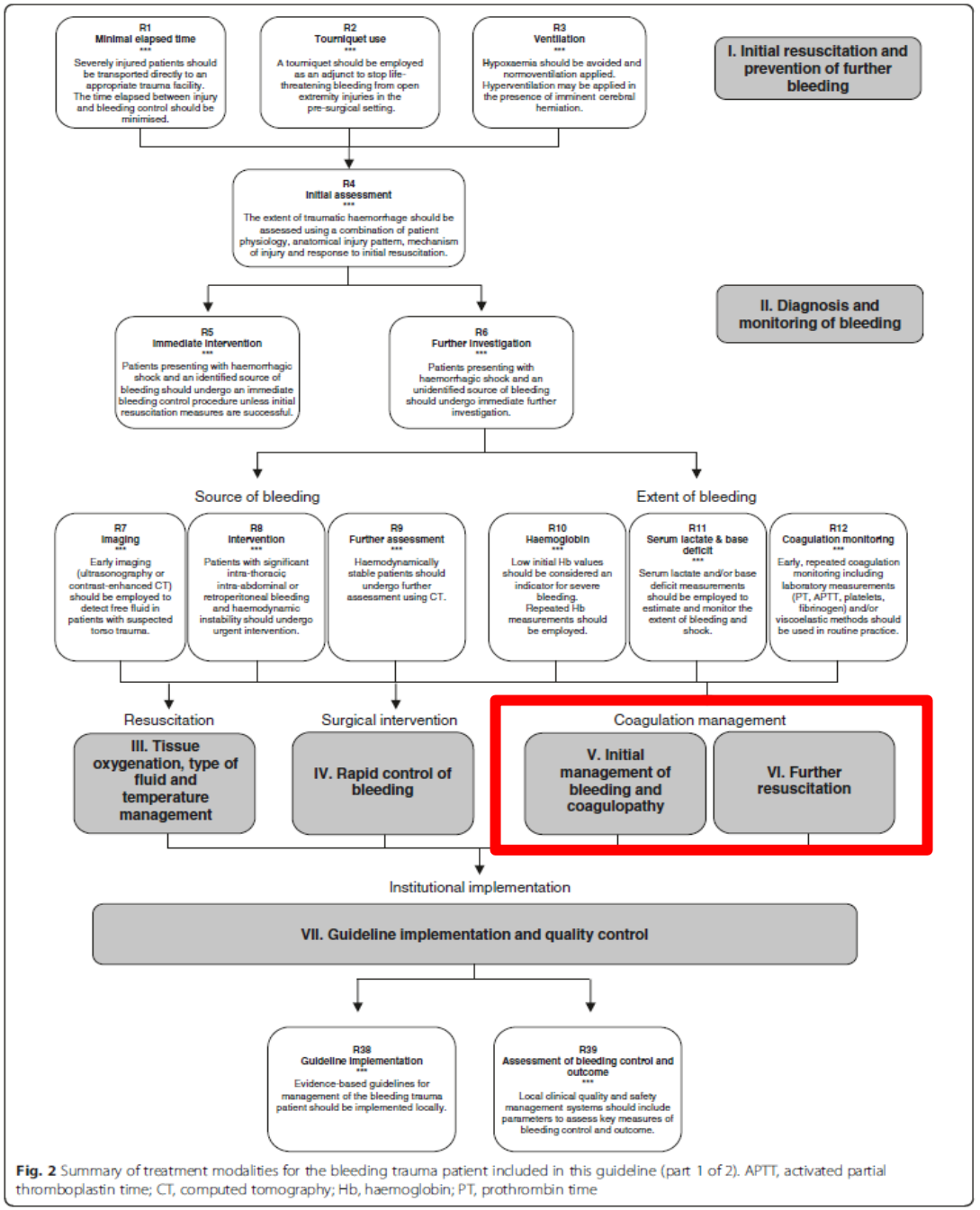


Fig. 2 Summary of treatment modalities for the bleeding trauma patient included in this guideline (part 1 of 2). APTT, activated partial thromboplastin time; CT, computed tomography; Hb, haemoglobin; PT, prothrombin time

R- 24 new Initial resuscitation

We define “initial resuscitation” as the period between arrival in the emergency department and availability of results from coagulation monitoring (coagulation screen, fibrinogen level and/or viscoelastic monitoring and platelet count)

Coagulation tests – timing?

- PT
- aPTT
- Fibrinogen

} > 45 min

88 minutes (range: 29–235 min)

Toulon, *Thromb Haemost 2009*

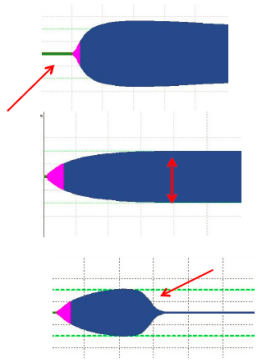
78 minutes (range: 62–103 min)

Davenport, *CCM 2011*

Viscoelastic Tests - ROTEM®/TEG®

Fast assessment of the individual coagulation status in **whole blood**

- **Initiation process of coagulation**
- **Clot strength**
- **Clot stability**



R- 24 new Initial resuscitation

ABC Advanced Bleeding Care

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

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Trauma-induced coagulopathy: impact of the early coagulation support protocol on blood product consumption, mortality and costs

- **Comparison between 2011 (1:1:1) vs. 2013 (early goal directed) coagulation management**
- **Patients with ISS > 15 and 3 RBC transfused**
- **Primary outcome: RBC, FFP and platelet transfusions**
- **Secondary outcomes:**
  - **Time to hemostasis**

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		2011	2013	*P*-value
Patients with ISS >15 and ≥3 U of PRBC		130	96	
Blood components transfused within 24 hr				
PRBC (U)	Mean (SD)	8.09 (6.7)	6.5 (4.8)	0.149
	Median (IQR)	5 (6.0)	4 (5.5)	
PTL (U)	Mean (SD)	4.18 (5.9)	2.68 (4.75)	0.046
	Median (IQR)	0 (6)	0 (6)	
Plasma (U)	Mean (SD)	8.97 (9.47)	4.21 (4.61)	<0.001
	Median (IQR)	6 (8)	4 (6)	
Outcome				
Dead within 24 hr	n (%)	8 (6.15%)	3 (3.12%)	0.361
Hospital mortality	n (%)	26 (20.0%)	13 (13.5%)	0.218

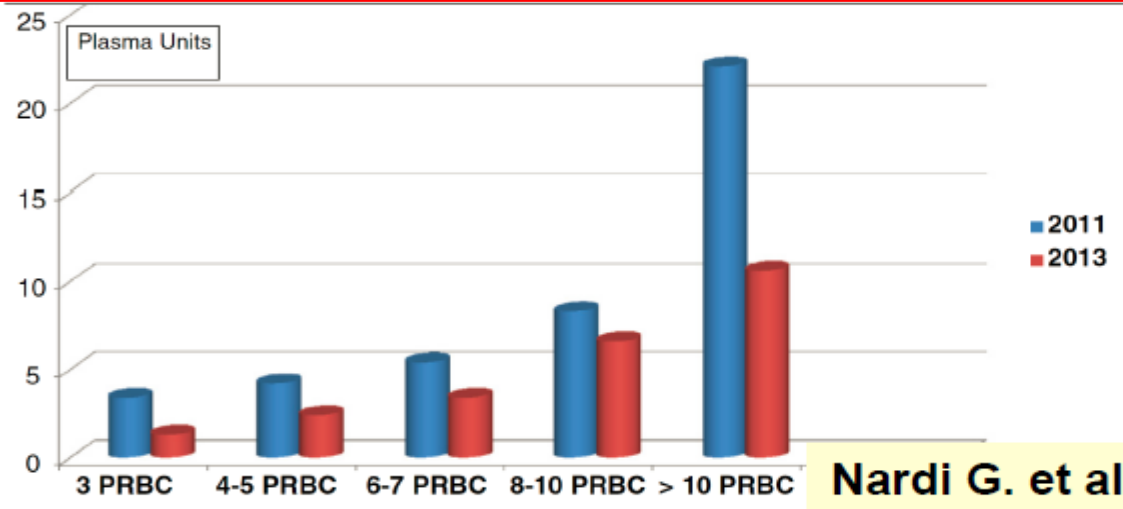

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Table 5 Estimated cost for blood, blood components, factors and point-of-care tests over the two periods (2011 versus 2013)

	Estimated cost for 1 U	2011		2013	
		Units (N)	Overall	Units (N)	Overall
PRBC	€186	1,048	€194,928	625	€116,250
Plasma	€60	1,167	€70,020	405	€24,300
PTL	€115	538	€61,870	258	€29,670
Overall			€326,818		€170,220
Balance					−€156,598
Fibrinogen	€400 (1 g)	0	0	134 g	€53,600
POC tests		0	0		€26,663
Overall		0	0		+€80,263
Balance					−€76,335

[a]POC, Point of care; PRBC, Packed red blood cells; PTL, Platelets.

Savings: 76'335 Euro

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ISS and mortality: Europe vs. US

Paper	ISS	Hospital Mortality Individualized Treatment Group with Algorithm
Holcomb 2013	26 (17 – 36)	25%
Holcomb 2015	26.5 (17 – 41)	24%
Nascimento	35 ± 13	14%
Schöchl 2011	35.2	7.5%
Innerhofer 2013	37 (29 – 50)	8%
Waifsade 2013	37.1 – 37.6	26% (no algorithm)
Nardi 2015	33 (15 – 51)	14%

Holcomb J. B. et al. JAMA Surg (2013) 148: 127
Holcomb J. B. et al. JAMA (2015) 313: 471
Nascimento B. et al. CMAJ (2013) 185: E583
Schöchl H., et al. Crit Care (2011) 15: R83
Innerhofer P. et al., Injury (2013) 44: 209
Wafaisade A. et al., J Trauma Acute Care Surg (2013) 74: 387
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R- 26 new Goal – directed therapy

We recommend that resuscitation measures be continued using a goal- directed strategy guided by standard laboratory coagulation values and/or viscoelastic tests.

Grade 1C

VI. Further resuscitation

R26
Goal-directed therapy
***
Resuscitation measures should be continued using a goal-directed strategy guided by standard laboratory coagulation values and/or viscoelastic tests.

R27
Plasma
***
In a plasma-based coagulation strategy plasma (FFP or pathogen-inactivated plasma) should be administered to maintain PT and APTT<1.5 times the normal control. Plasma transfusion should be avoided in patients without substantial bleeding.

R28
Fibrinogen & cryoprecipitate
***
If a concentrate-based strategy is used, fibrinogen concentrate or cryoprecipitate should be administered 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. An initial fibrinogen supplementation of 3-4 g, equivalent to 15-20 single donor units of cryoprecipitate or 3-4 g fibrinogen concentrate may be administered. Repeat doses must be guided by viscoelastic monitoring and laboratory assessment of fibrinogen levels.

R29
Platelets
***
Platelets should be administered to maintain a platelet count >50 × 10^9/l. A platelet count >100 × 10^9/l in patients with ongoing bleeding and/or TBI may be maintained. If administered, an initial dose of 4-8 single platelet units or one aphaeresis pack may be used.

R30
Calcium
***
Ionised calcium levels should be monitored and maintained within the normal range during massive transfusion.

R31
Antiplatelet agents
***
Platelets may be administered in patients with substantial bleeding or intracranial haemorrhage who have been treated with APA. Platelet function may be measured in patients treated or suspected of being treated with APA. Platelet concentrates may be used if platelet dysfunction is documented in a patient with continued microvascular bleeding.

R32
Desmopressin
***
Desmopressin (0.3 µg/kg) may be administered in patients treated with platelet-inhibiting drugs or with von Willebrand disease. Desmopressin may not be administered routinely in the bleeding trauma patient.

R33
Prothrombin complex concentrate
***
PCC should be used early for the emergency reversal of vitamin K-dependent oral anticoagulants. PCC may be administered to mitigate life-threatening post-traumatic bleeding patients treated with novel anticoagulants. If fibrinogen levels are normal, PCC or plasma may be administered in the bleeding patient based on evidence of delayed coagulation initiation using viscoelastic monitoring.

R34
Direct oral anticoagulants – FXa inhibitors
***
Plasma levels of oral anti-factor Xa agents such as rivaroxaban, apixaban or edoxaban may be measured in patients treated or suspected of being treated with one of these agents. If measurements are not possible or available advice from an expert haematologist may be sought. Life-threatening bleeding may be treated with i.v. TXA15 mg/kg (or 1 g) and high-dose (25-50 U/kg) PCC/aPCC until specific antidotes are available.

R35
Direct oral anticoagulants – Thrombin inhibitors
***
Dabigatran plasma levels may be measured in patients treated or suspected of being treated with dabigatran. If measurements are not possible or available thrombin time and APTT may be measured to allow a qualitative estimation of the presence of dabigatran. Life-threatening bleeding should be treated with idarucizumab (5 g i.v.) or if unavailable it may be treated with high-dose (25-50 U/kg) PCC / aPCC, in both cases combined with TXA 15 mg/kg (or 1 g) i.v.

R36
Recombinant activated coagulation factor VII
***
Off-label use of rFVIIa may be considered only if major bleeding and traumatic coagulopathy persist despite standard attempts to control bleeding and best practice use of conventional haemostatic measures.

R37
Thromboprophylaxis
***
Pharmacological thromboprophylaxis should be employed within 24 h after bleeding has been controlled. Early mechanical thromboprophylaxis with intermittent pneumatic compression should be applied and early mechanical thromboprophylaxis with anti-embolic stockings may be applied. Inferior vena cava filters as thromboprophylaxis should not be routinely employed.

Závěr

- Managment léčby akutního krvácení probíhá ve 2 na sebe navazujících fázích
- fáze iniciální resuscitace podáváme:
  - **EBR, FFP v poměru 2:1**

    nebo
  - **koncentrát fibrinogenu a EBR**

    dle aktuální výsledků SLT/viskoelastických testů
- Ve fázi pozdější resuscitace:
  - **cílená hemosubstituční terapie**

    dle aktuálních výsledků SLT/viskoelastických testů
- Implementace doporučených postupů do léčebného algoritmu zdravotnického zařízení

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IČ:29295637

Obsluha :Obsluha 1 po 13.06.2016 22:14:47
POS:POS_1 Účtenka č.:29307
Stůl: Stůl 45 rozúčtování

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6 x Dalešická 11° 0,5 l	
6 x 33,00	198,00
Mezisoučet	528,00
Hotovost	528,00
Základ DPH 21%	436,34
DPH 21%	91,66
Celkem DPH 21%	528,00
Celkem placeno	528,00

---DĚKUJEME---