

När det blöder- målstyrd transfusionsbehandling



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Blödning

- Trauma: 10-15% blöder, 2,5% blöder massivt *Halmin M et al Crit Care 2013*

| | No RBC Transfusions | 1-9U RBC Transfusions | ≥ 10U RBC Transfusions |
|---------------------------------|---------------------|-----------------------|------------------------|
| Number of subjects (% of total) | 5,136 (87.4) | 589 (10.0) | 152 (2.6) |

- Obstetrisk blödning: ca 0,7-1 % får blodtransfusion vid/efter förlossning, ca 0,2% stor blödning ≥ 6 enh. E-konc. (egna siffror Stockholm)
- Thorax kirurgi
- Aorta/kärlkirurgi
- Levertransplantation
- Ortopediska operationer
- Cancerkirurgi
- Gastrointestinal blödning

Behandling

Traumapack

4:4:1 (4 enheter erytrocyter ,
4 enheter plasma, 1 enhet trombocyter)
cryoprecipitat

Tranexamsyra

Fibrinogenkoncentrat

rFVIIa (NovoSeven)

Protrombincomplex koncentrat (PCC)

Faktor VIII

Faktor XIII koncentrat (Cluvot)

Antitrombinkoncentrat



Hög ratio plasma/erythrocyter och trombocyter/erythrocyter

The American Journal of Surgery (2009) 197, 565–570

Zink KA et al

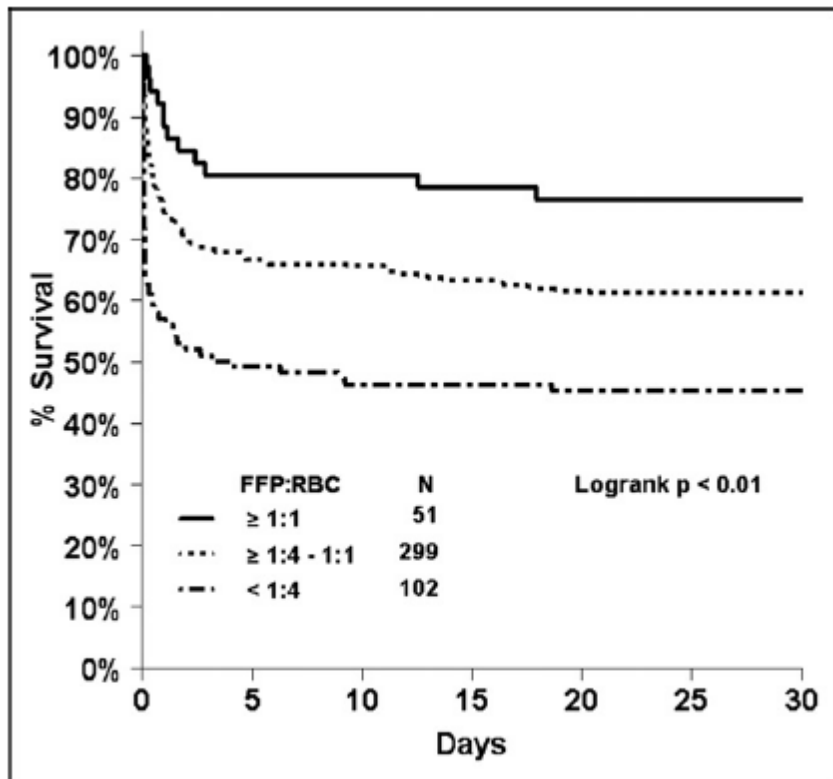


Figure 1 Survival by FFP:red blood cell ratio.

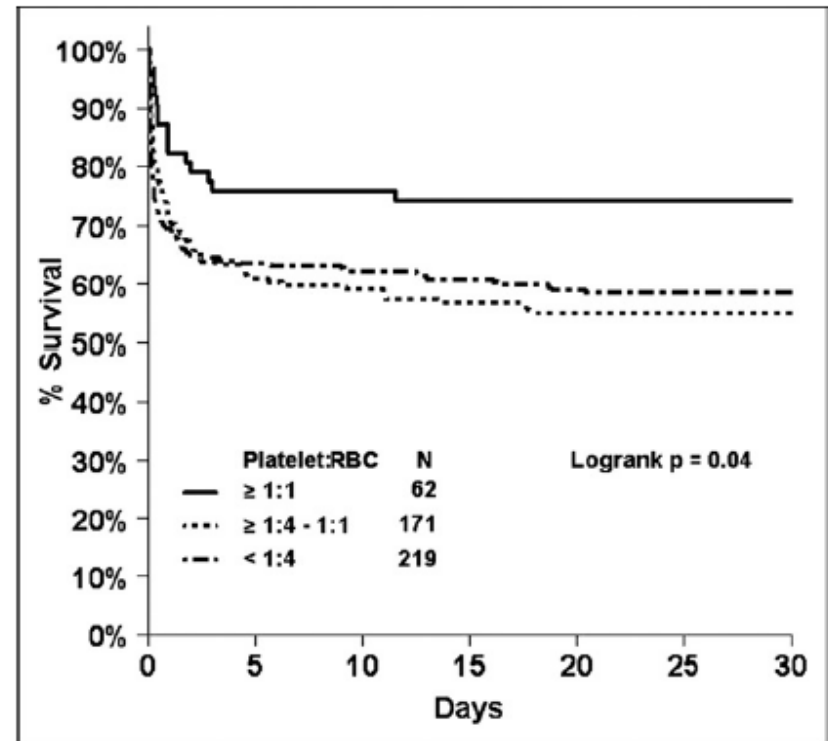
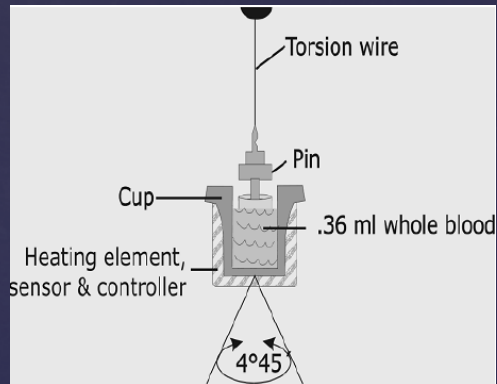


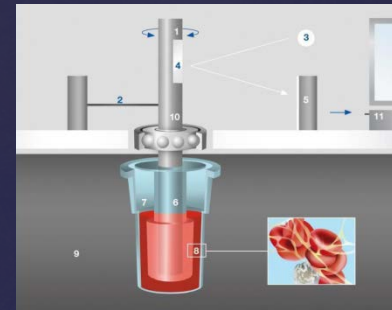
Figure 2 Survival by PLT:red blood cell ratio.

Multicenter, retrospektivt 466 trauma patienter med massiv transfusion



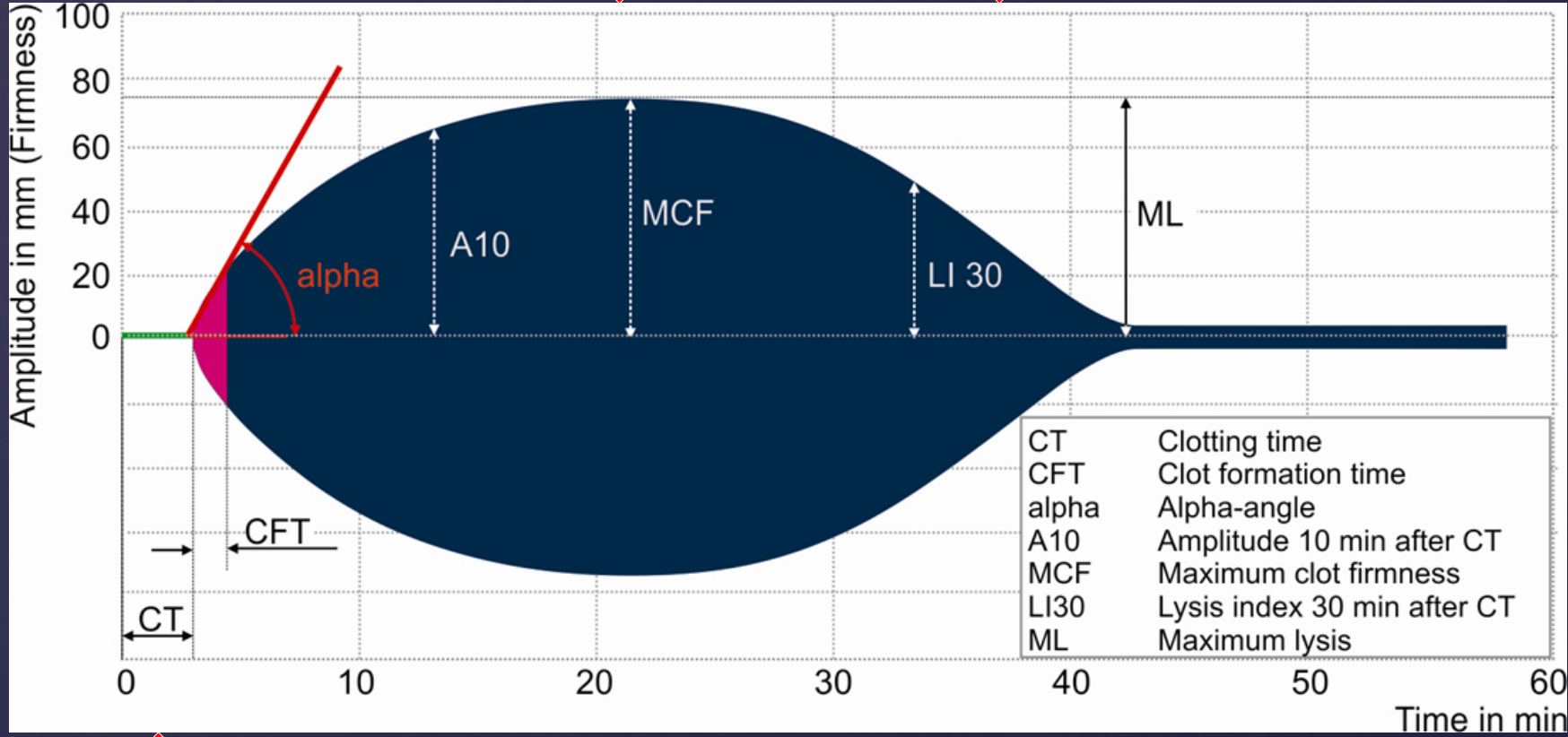
Kaolin aktivering
 Funktionellt fibrinogen
 Heparinas
 Platelet mapping
 Rapid TEG

Reagens



Extem
 Intem
 Fibtem
 Heptem
 Aptem
 Platelets

Fibrinogen, trombocyter Fibrinolys



Koagulations faktorer

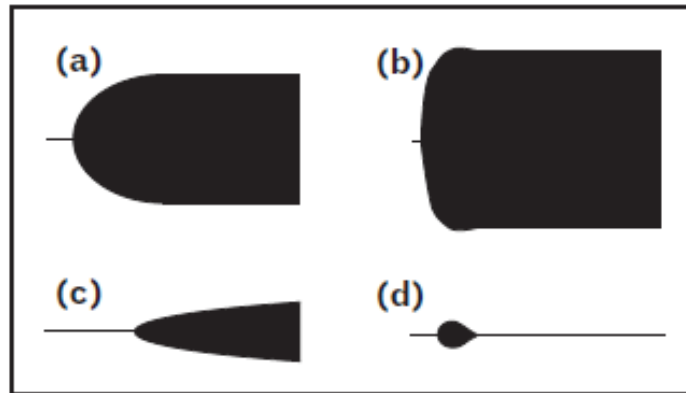


FIGURE 2. Schematic presentation of various VHA tracings: (a) normal, (b) hypercoagulability, (c) hypocoagulability and (d) primary hyperfibrinolysis. Source: [20] Scand J Trauma Resusc Emerg Med (previously published).

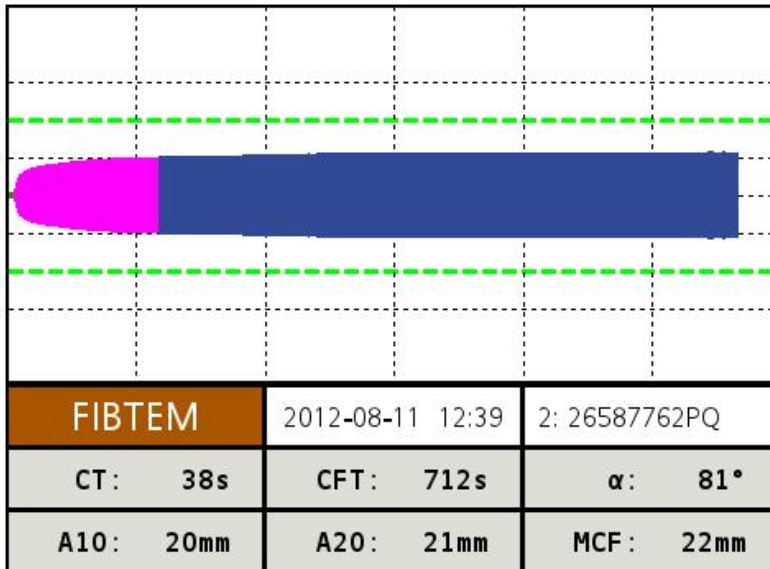
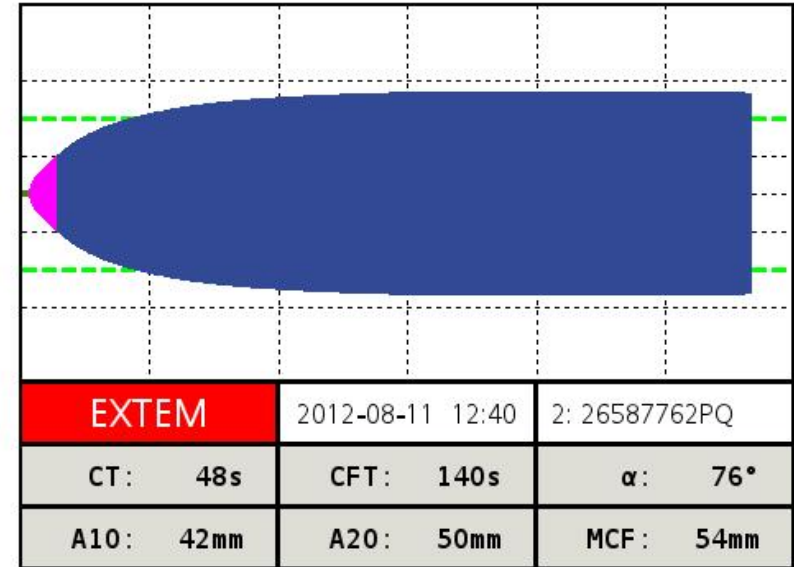
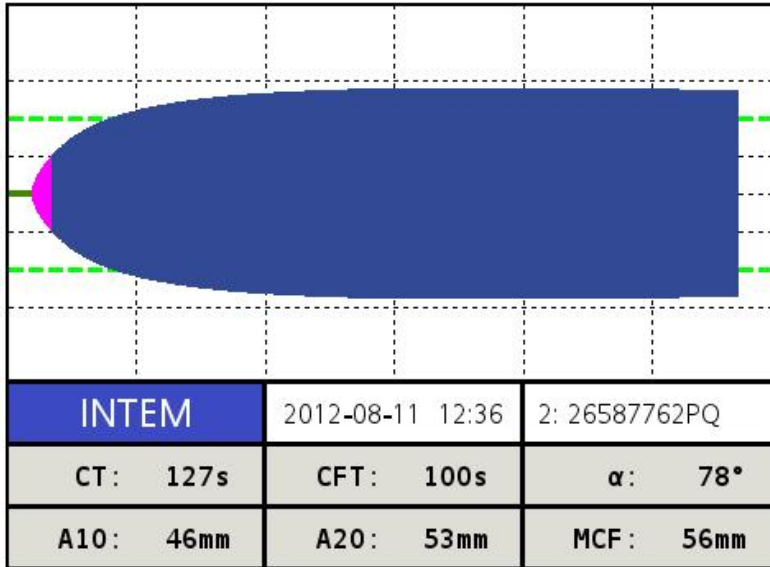
Johansson PI et al

Table 1 Grading of recommendations after [24] (reprinted with permission)

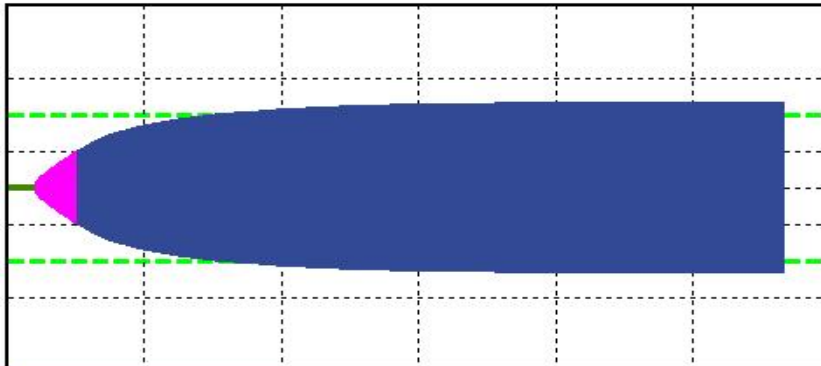
| Grade of Recommendation | Clarity of risk/benefit | Quality of supporting evidence | Implications |
|--|---|--|---|
| 1A Strong recommendation, high-quality evidence | Benefits clearly outweigh risk and burdens, or vice versa | RCTs without important limitations or overwhelming evidence from observational studies | Strong recommendation, can apply to most patients in most circumstances without reservation |
| 1B Strong recommendation, moderate-quality evidence | Benefits clearly outweigh risk and burdens, or vice versa | RCTs with important limitations (inconsistent results, methodological flaws, indirect or imprecise) or exceptionally strong evidence from observational studies | Strong recommendation, can apply to most patients in most circumstances without reservation |
| 1C Strong recommendation, low-quality or very low-quality evidence | Benefits clearly outweigh risk and burdens, or vice versa | Observational studies or case series | Strong recommendation but may change when higher quality evidence becomes available |
| 2A Weak recommendation, high-quality evidence | Benefits closely balanced with risks and burden | <p><i>We recommend the application of transfusion algorithms incorporating predefined intervention triggers based on POC coagulation monitoring assays to guide haemostatic intervention during cardiovascular surgery. 1C</i></p> | |
| 2B Weak recommendation, moderate-quality evidence | Benefits closely balanced with risks and burden | | |
| 2C Weak recommendation, Low-quality or very low-quality evidence | Uncertainty in the estimates of benefits, risks and burden; benefits, risk and burden may be closely balanced | Observational studies or case series | Very weak recommendation; other alternatives may be equally reasonable |

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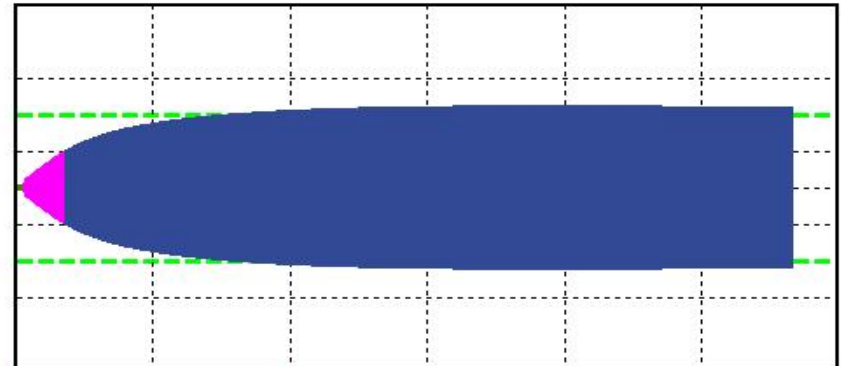
- Citratrör till transfusionsmedicin (rörpost eller någon som lämnar)
- Provet sätts 5 min. efter provtagning
- Kurvan ses på skärm bed-side på operation/IVA inom 10 min.
- Tolkning och bedömning av behandlande läkare inom 15-20 min.
- Riktad behandling



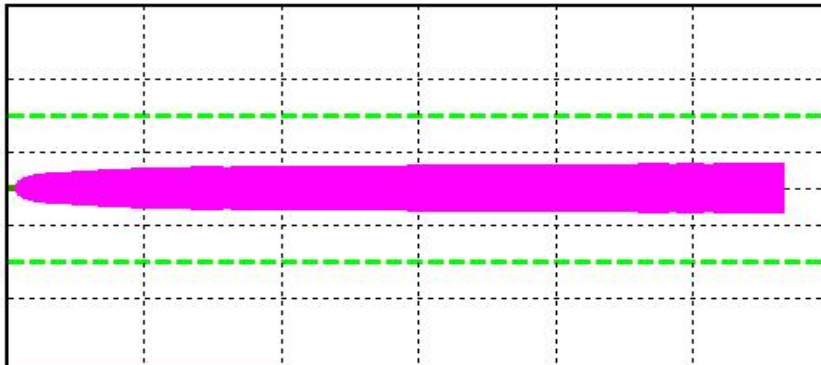
Normal range
 Intem CT 30-110s
 CFT 100-140s
 MCF 50-72 mm
 Extem CT 30-79 s
 CFT 34-159 s
 MCF 50-72 mm
 Fibtem
 MCF 9-25 mm



| | | |
|--------------|------------------|----------------|
| INTEM | 2012-10-10 12:34 | 2: 27092644PQ |
| CT: 137s | CFT: 193s | α : 69° |
| A10: 36mm | A20: 43mm | MCF: 46mm |



| | | |
|--------------|------------------|----------------|
| EXTEM | 2012-10-10 12:36 | 2: 27092644PQ |
| CT: 39s | CFT: 195s | α : 70° |
| A10: 35mm | A20: 42mm | MCF: 45mm |

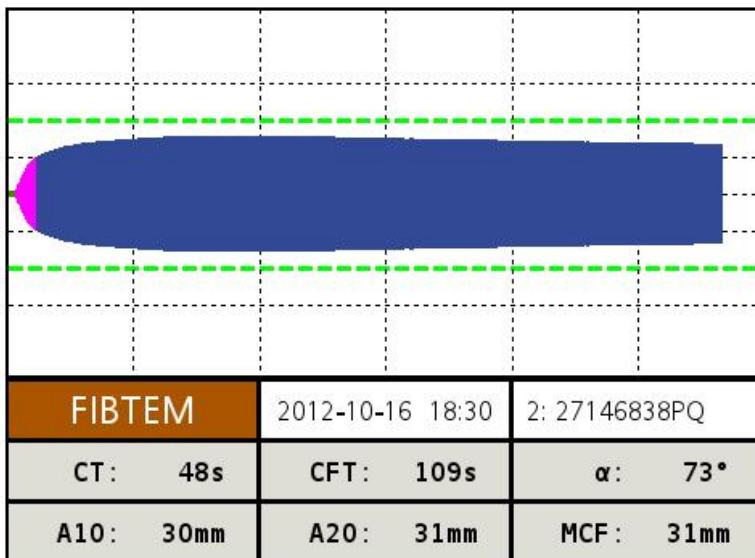
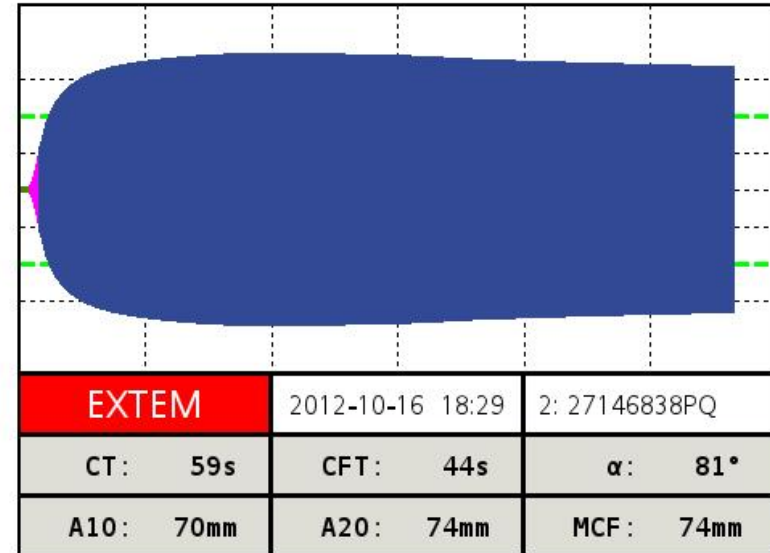
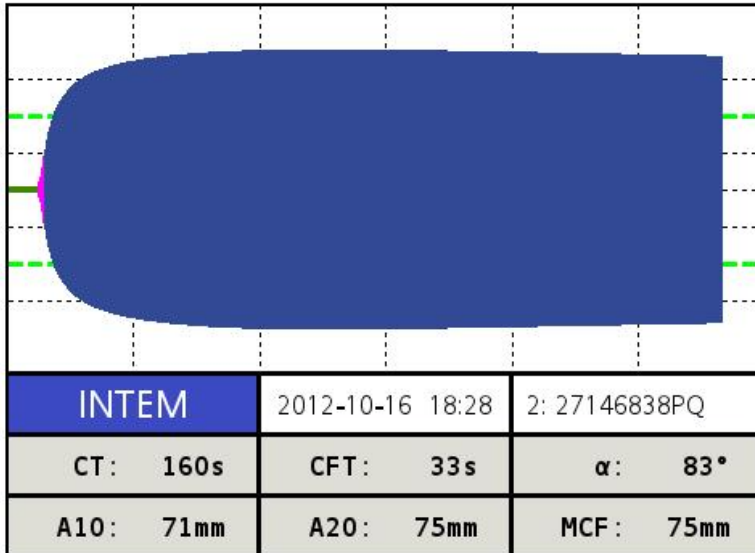


| | | |
|---------------|------------------|----------------|
| FIBTEM | 2012-10-10 12:37 | 2: 27092644PQ |
| CT: 48s | CFT: - s | α : 57° |
| A10: 11mm | A20: 11mm | MCF: 12mm |

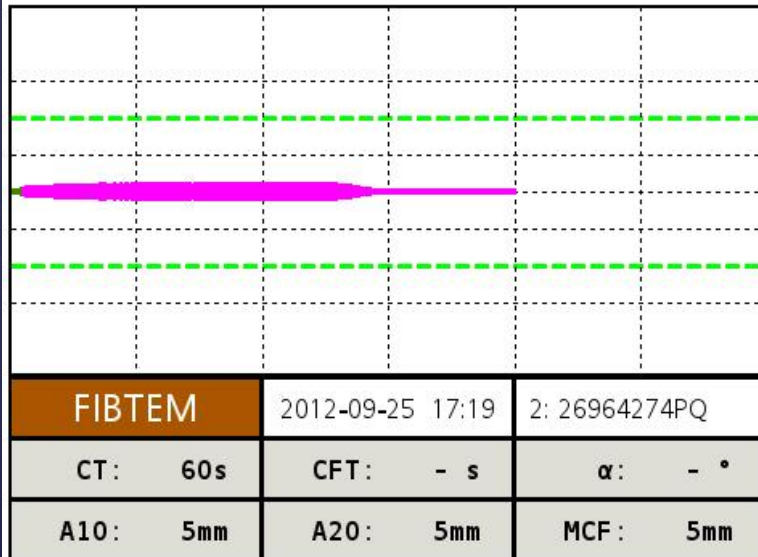
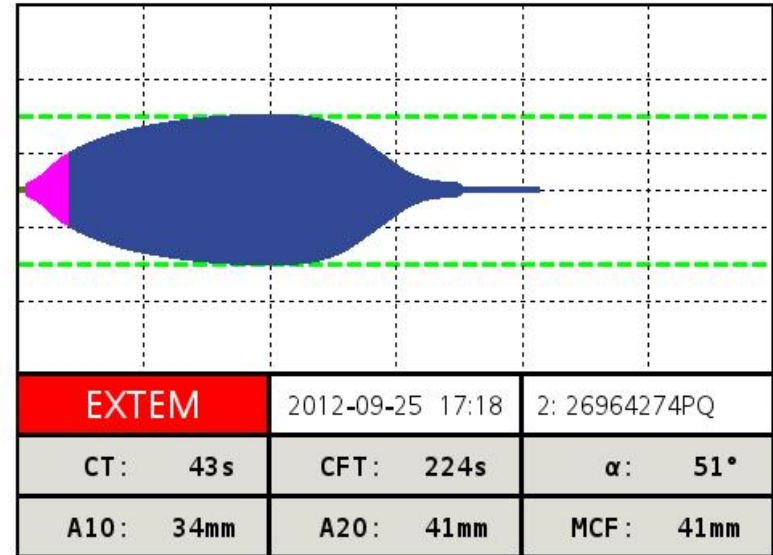
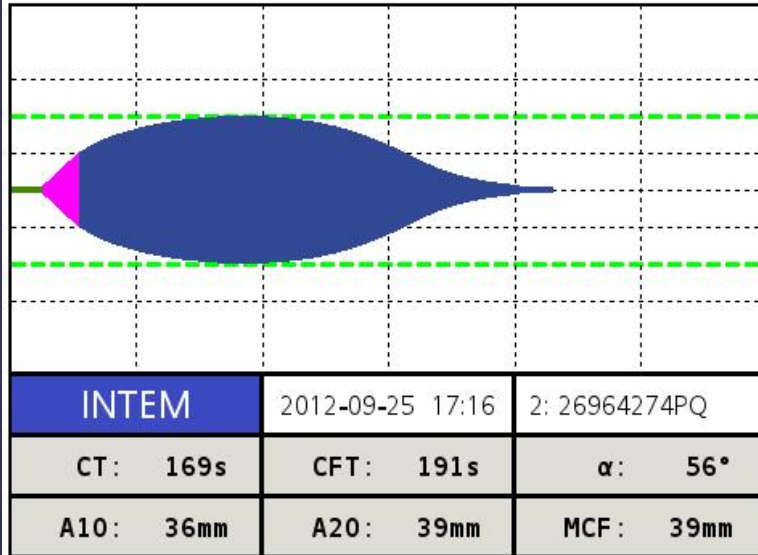
Normal range
 Intem CT 30-110s
 CFT 100-140s
 MCF 50-72 mm
 Extem CT 30-79 s
 CFT 34-159 s
 MCF 50-72 mm
 Fibtem
 MCF 9-25

Mätmodul ROTEM®

| Förberedelse | MultITEM | Skärmbild | Standard-överlagring | Patient-överlagring | Hjälp | Lämna | |
|---|----------|-----------|--|---------------------|-------|---------------|--|
| 1 | | | INTEM | 2 | | EXTEM | |
| | | | ST: 16:42:40 RT: 01:00:18 CT: 910 s [0100 -- 0240] CFT: 657 s [0030 -- 0110] α: --- A10: 19 mm [0044 -- 0066] A20: 25 mm [0050 -- 0071] MCF: * 30 mm [0050 -- 0072] ML: * 0 % | | | | ST: 16:43:37 RT: 01:00:18 CT: 84 s [0038 -- 0079] CFT: 184 s [0034 -- 0159] α: 60 ° [0063 -- 0083] A10: 35 mm [0043 -- 0065] A20: 42 mm [0050 -- 0071] MCF: 44 mm [0050 -- 0072] ML: * 7 % |
| 3 | | | FIBTEM | 4 | | HEPTEM | |
| | | | ST: 16:44:42 RT: 01:00:20 CT: 142 s CFT: --- α: --- A10: 3 mm [0007 -- 0023] A20: 5 mm [0008 -- 0024] MCF: 4 mm [0009 -- 0025] ML: * 20 % | | | | ST: 17:05:59 RT: 01:00:18 CT: 152 s CFT: 189 s α: 58 ° A10: 35 mm A20: 42 mm MCF: 43 mm ML: * 8 % |
| 2015-01-27T18:06:20 v2.2.0 Användare: Admin | | | Temperatur: 37.0°C Pre 1 2 3 4 | | | | |



Normal range
 Intem CT 30-110s
 CFT 100-140s
 MCF 50-72 mm
 Extem CT 30-79 s
 CFT 34-159 s
 MCF 50-72 mm
 Fibtem
 MCF 9-25



Normal range
 Intem CT 30-110s
 CFT 100-140s
 MCF 50-72 mm
 Extem CT 30-79 s
 CFT 34-159 s
 MCF 50-72 mm
 Fibtem
 MCF 9-25 mm

Thrombelastography (TEG) or thromboelastometry (ROTEM) to monitor haemotherapy versus usual care in patients with massive transfusion (Review)

Afshari A, Wikkelso A, Brok J, Møller AM, Wetterslev J



**THE COCHRANE
COLLABORATION®**

2011

9 RCT

776 patienter inkluderade,
thoraxkirurgi,
levertransplantation

Konklusion:

- Moderat stöd för att det medför minskad blödning och minskat transfusionsbehov
- ingen effekt på mortalitet, antal vård dagar, komplikationer
- Fler studier med fler inkluderade efterfrågas
- Studier vid olika kliniska tillstånd efterfrågas: trauma, aneurysm op, obstetriska blödningar, sepsis, pediatrika/neonatala tillstånd

Thromboelastography (TEG) and rotational thromboelastometry (ROTEM) for trauma induced coagulopathy in adult trauma patients with bleeding (Review)

Hunt H, Stanworth S, Curry N, Woolley T, Cooper C, Ukoumunne O, Zhelev Z, Hyde C



2015

Syfte: Att diagnostisera TIC vid blödning

Inklusion 3 studies (300, 90, 40). ROTEM MCF jmf med INR

Konklusioner: låg evidens, otillräckliga studier, fler studier krävs, fler parametrar behöver analyseras



Thank You!
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