Shark attack and lower limb blood loss

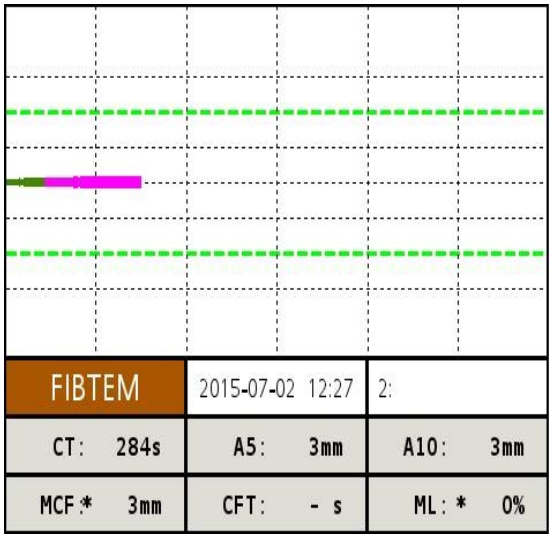
Disclaimer / Pre-amble

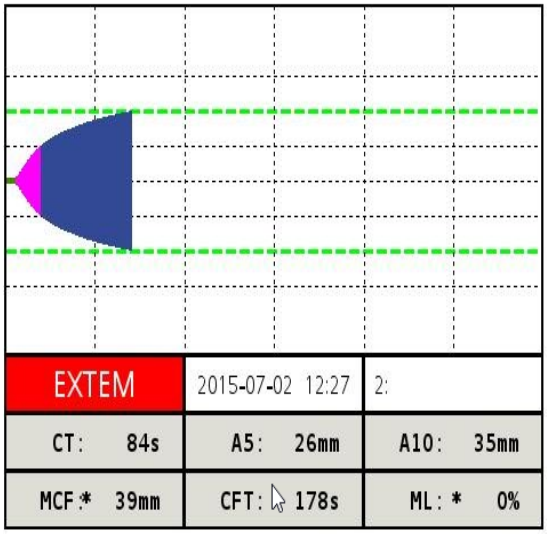
- These cases have been de-identified to protect the identity of the patient and the treating teams.
- These are all real cases and real ROTEMs. The individuals involved in these difficult cases have agreed to anonymously share these with us – thank you for your generosity.
- Successful management of the bleeding patient involves much more than just administration of blood products.
- The primary aim of these cases is to teach the use ROTEM guided blood product therapy. We have deliberately not included a lot of detail about some of the other aspects of management which might detract from this focus.

Case Shark Attack – 2016

- **Surf board rider with serious injuries to legs from shark attack**
- **Rescued from surf by other surfers and life savers with leg rope tourniquets**
- Helicopter transport 2 units O neg on route . Red blanket straight to trauma theatre from helipad.
- Blood gas result pH 7.08 BE -18 Lactate 10.5
- **Rotem** on arrival in theatre **Fibtem A5 = 3mm** Extem CT 84 sec Extem A5 26mm

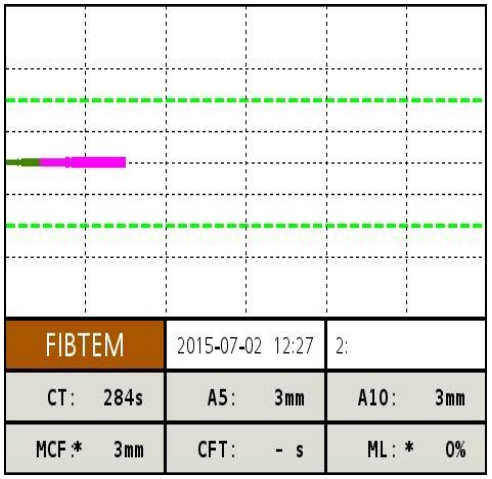
- **Imagine you are the treating clinician – Practice applying one the ROTEM algorithms to decide what treatments you will now give.**

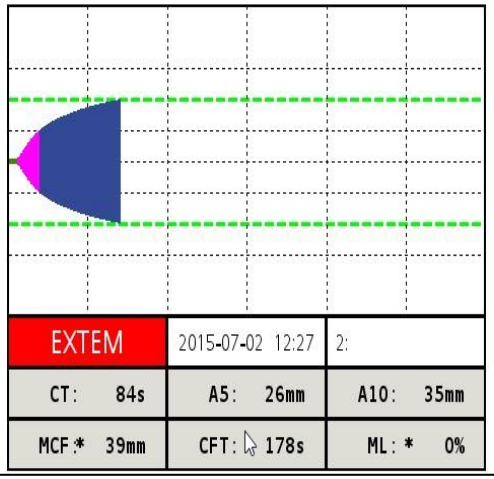




Case Shark Attack – 2016

- **Imagine you are the treating clinician - Use one of the ROTEM algorithms to decide what treatments you will give**





- **Using the GCUH Trauma algorithm:**

Step 1 : Hyperfibrinolysis – Extem A5 < 35mm and so hyperfibrinolysis is likely to be present – Give Tranexamic acid 1g (if not already given)

Step 2: Fibrinogen – Fibtem A5 = 3mm – Give 1g FC / 25 kg – Young male so give 4g of Fib conc (alternatively 20units cryo if FC not available)

Step 3: Platelets – Fibtem A5 < 10mm – treat this first then recheck

Step 4: Factors – Extem CT = 84s (<90s) – not needed

Summary:

- **Tranexamic Acid 1g**
- **Fibrinogen Concentrate 4g**

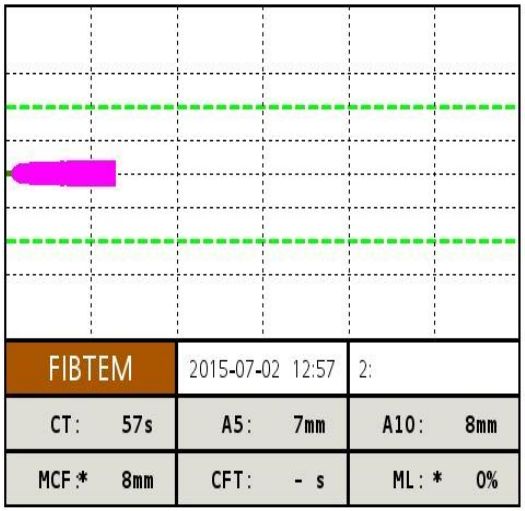
Don't forget:

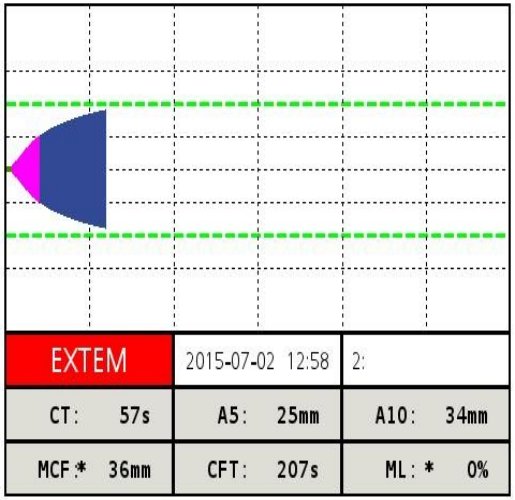
- **Red cells (aim Hb>70), Warm all blood / fluids, aim Temp > 36, iCa > 1mmol/L**

Case Shark Attack – 2016

- The patient was actually given 10 units O Neg stat + **4 gm Fibrinogen Concentrate (RiaSTAP)** for critical bleeding.
- A repeat ROTEM is performed:

Rotem Fibtem A5 = 7mm only a 4 mm increase
Expected Fibtem increment following 4 gm FC would be ~ 8mm. But there has obviously been major ongoing blood loss (10units red cells), causing further consumption.





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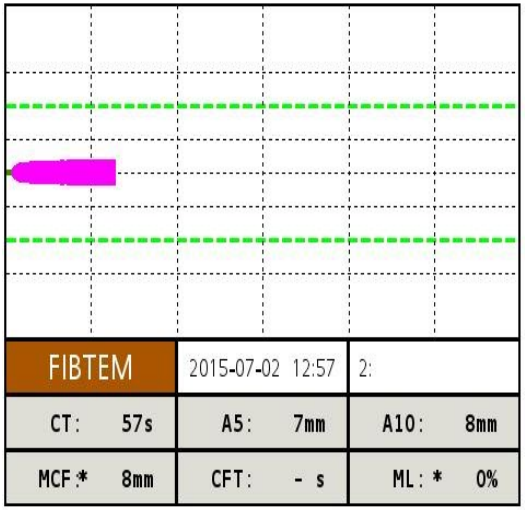
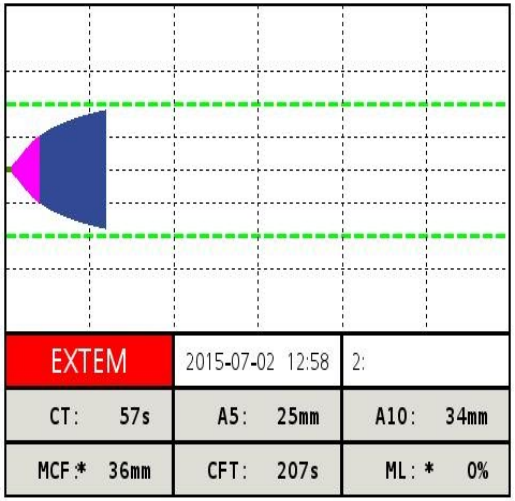
Case Shark Attack – 2016





- **Imagine you are the treating clinician – Practice applying one the ROTEM algorithms to decide what treatments you will now.**

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Step 1 : Hyperfibrinolysis – Extem A5 < 35mm and so hyperfibrinolysis is likely to be present – Give Tranexamic acid 1g (if not already given)

Step 2: Fibrinogen – Fibtem A5 = 7mm – Give 1g FC / 25 kg – Young male so give 4g of Fib conc (alternatively 20units cryo if FC not available)

Step 3: Platelets – Fibtem A5 < 10mm – platelets not needed treat this first then recheck

Step 4: Factors – Extem CT = 57s (<90s) – not needed

Summary:

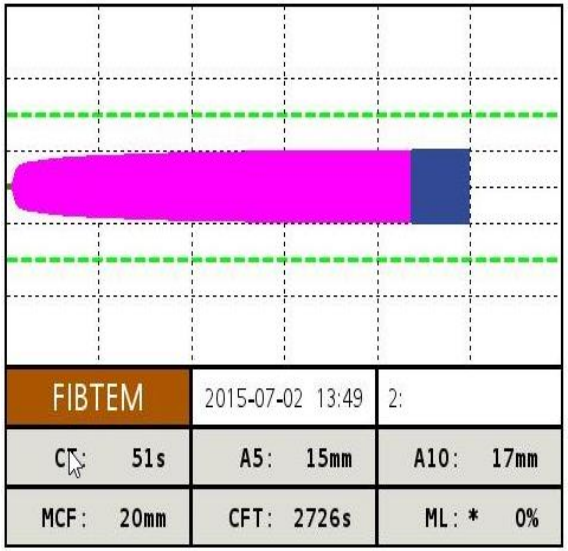
- **Fibrinogen Concentrate 4g**

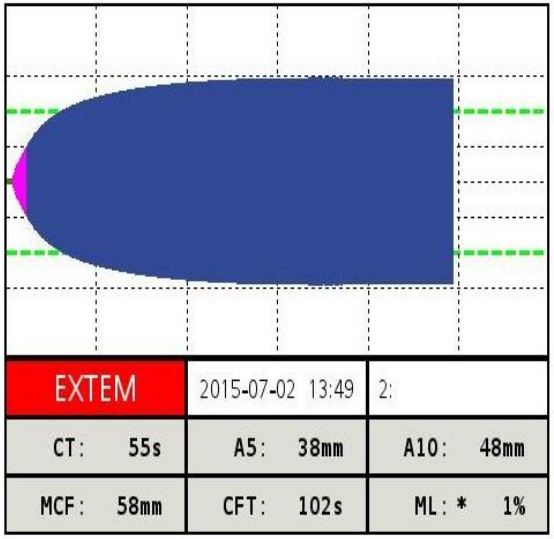
Don't forget:

- **Red cells (aim Hb>70), Warm all blood / fluids, aim Temp > 36, iCa > 1mmol/L**

Case Shark Attack – 2016

- He is given 20units of cryoprecipitate
- **Rotem Fibtem A5 = 15mm** - Good result as increment 8mm
- Extem A5 = 38 mm – no requirement for Platelet TX
- Target Fibtem A10 value => 15mm ~ = 3.0 g/L laboratory fibrinogen





Case Shark Attack – 2016

SUMMARY of blood products

- Fibrinogen concentrate 4g
- Cryoprecipitate 20 units
- Red cells 10-12 units

- He probably got Tranexamic acid but unfortunately we don't have this information.

Comments:
This patient didn't receive (or need) any plasma or platelets despite his massive blood loss.

Discussion Points

One:

Fibrinogen deficiency is the most common coagulation problem to develop in major haemorrhage.

Two:

Rapid correction of severe fibrinogen deficiency is more feasible using fibrinogen concentrate.

Three:

Thrombin generation (as measured by Extem CT) is often well preserved in major haemorrhage and a strategy of using pre-emptive large volumes of FFP (which contain very low levels of fibrinogen and no platelets) is not supported by viscoelastic / ROTEM guided treatment.