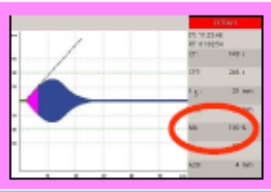
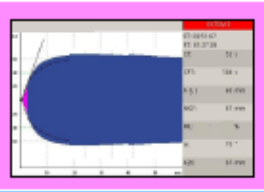
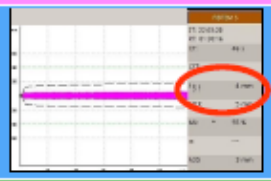
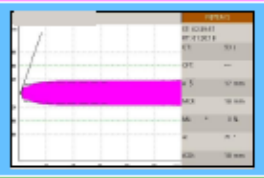
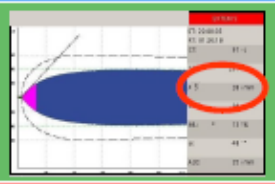
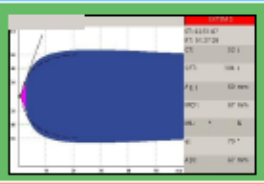
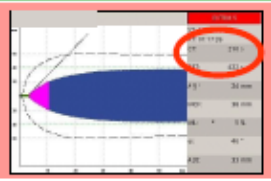
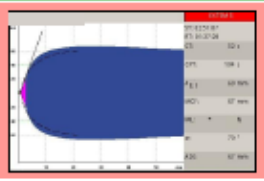
Bleeding after non elective CS – how long should it take to correct the low fibrinogen!

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.

KEMH ROTEM Algorithm for Critical Bleeding

Key Points: This algorithm should be used in conjunction with the KEMH Critical Bleeding Protocol. Only treat abnormal values if active bleeding or at high risk of bleeding. Repeat ROTEM analysis 10 mins after intervention to assess response.

	ABNORMAL ROTEM	CRITERIA	DIAGNOSIS	INTERVENTION	CORRECTED ROTEM
FIBRINOLYSIS		Early Diagnosis **EXTEM A5≤35mm** or **FIBTEM CT >600s**	**High likelihood of excess fibrinolysis**	**Tranexamic acid 1g** Consider repeat dose if has lost over 1 blood volume since initial dose	
		Late Diagnosis **EXTEM or FIBTEM ML ≥5%**	**Excess fibrinolysis**		
FIBRINOGEN		**FIBTEM A5≤10mm**	**Low fibrinogen**	**Cryoprecipitate OR Fibrinogen concentrate** (see dosing guide)	
PLATELETS		**EXTEM A5 ≤35mm** and FIBTEM A5 ≥10mm	**Low platelets**	**Platelets: 1 adult dose** (correlate with platelet count)	
		EXTEM A5 ≤25mm and FIBTEM A5 ≤10mm	**Low platelets** and **Low fibrinogen**	**Platelets and fibrinogen** (correlate with platelet count)	
FACTORS		**EXTEM CT 80-140s** and FIBTEM A5 ≤10mm	**Low fibrinogen**	Correct **fibrinogen** and reassess	
		EXTEM CT >80s but FIBTEM A5 >10mm	**Low coagulation factors**	**FFP 1-2U** or **Prothrombinex 10 U/kg** (+ fibrinogen if indicated)	
		EXTEM CT >140s and FIBTEM A5 ≤10mm	**Low fibrinogen and Low coagulation factors**		

Fibrinogen Dosing Guide

FIBTEM A5 Target: ≥12mm

FIBTEM A5	Increase required	Cryoprecipitate*	Fibrinogen Concentrate
9-10mm	2-3 mm	10 Units	2g
7-8mm	4-5 mm	15 Units	3g
4-6mm	6-8 mm	20 Units	4g
<4mm	≥9mm	25 Units	5g

*Cryoprecipitate dosing is for standard adult units
(Cryo 5 units / Fib Conc 1g = Fibtem A5 increase of approx 2mm)

Fibrinogen Concentrate

Guidelines For Use

- Consultant anaesthetist or haematologist approval required.
- Patients must be experiencing life threatening haemorrhage.
- Fibrinogen concentrate is indicated if the FIBTEM A5 is <7mm OR there is a high suspicion of coagulopathy in a life threatening haemorrhage.
- Use at higher FIBTEM values may be appropriate in patients refusing cryoprecipitate.

Administration

- Reconstitute 1g in 50ml warm sterile water (use prepared kit in fluid warmer).
- Swirl gently and do not shake (to avoid foaming).
- Administer each 1g via syringe driver over 2-4 mins if life-threatening haemorrhage or over 10 mins if not.

Cryoprecipitate

May be supplied as standard adult units or as aphaeresis units (or a combination)

1 aphaeresis unit = 2 standard adult units.
Dosing guide is for standard adult units.

Prothrombinex

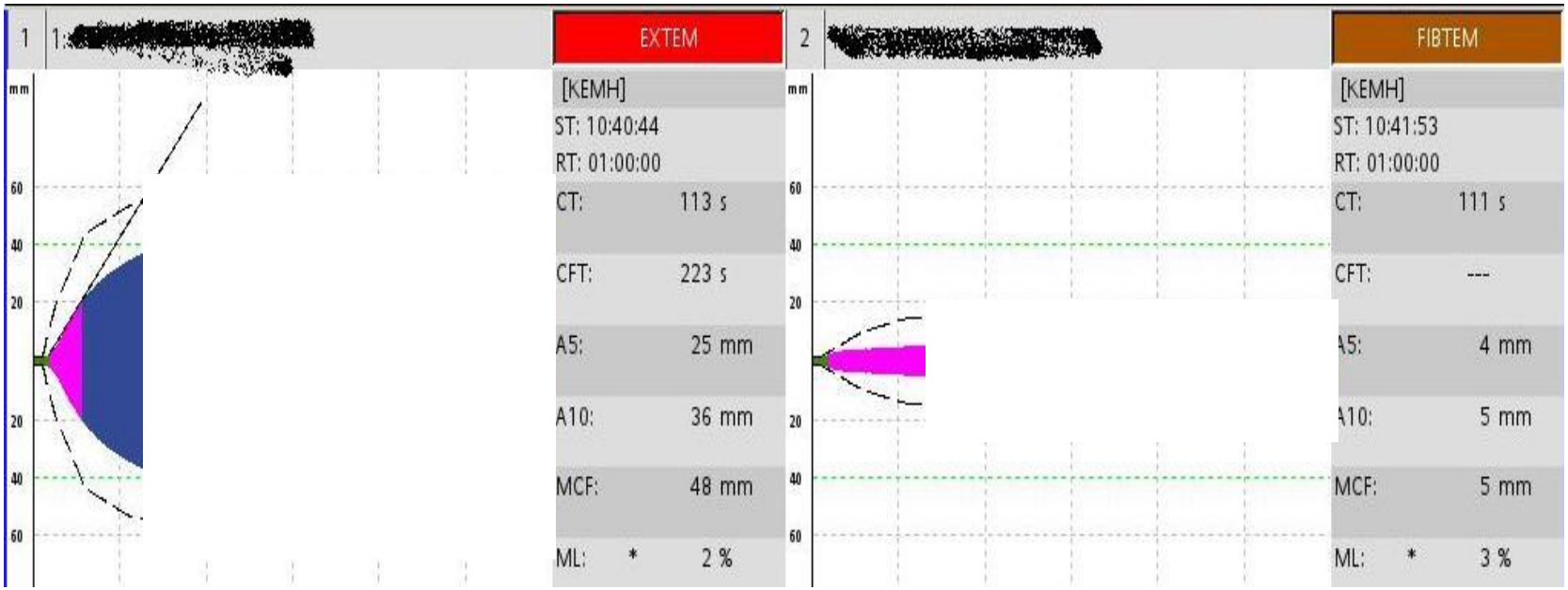
1. Warfarin Reversal: Indicated for urgent reversal of warfarin in critical bleeding, usual dose 25-50U/kg (+/- FFP) discuss with haematologist.

2. Consider as an alternative to FFP for patients with coagulation factor deficiency (e.g. prolonged EXTEM CT see above) in the following circumstances:
- Circulatory overload
- FFP not easily available (e.g. off site laboratory or staff)
- Rapid correction in extreme coagulopathy
- Consider lower dose 10U/kg (round to nearest 500U).

Endorsed by the Department of Anaesthesia and Pain Medicine and the Hospital Transfusion Committee on xxxx

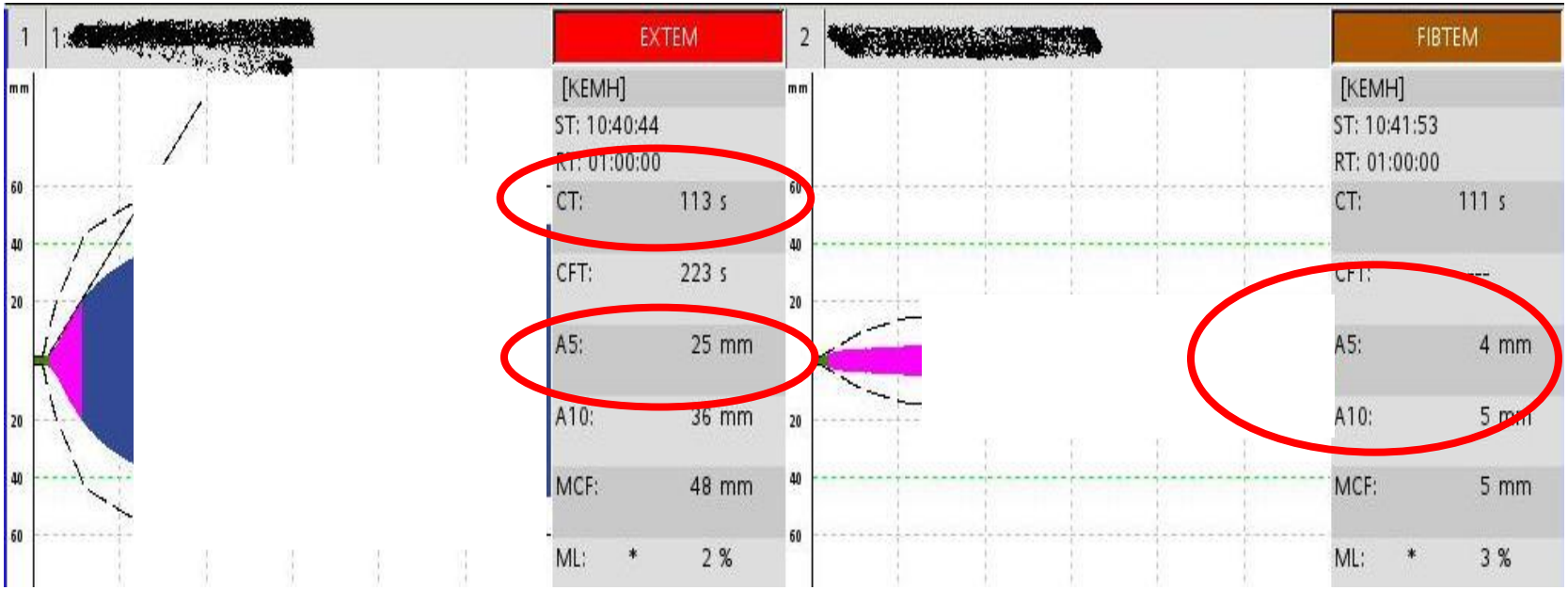
CASE 1 – Real case 2015

- Bleeding post non elective caesarean
- 70kg woman
- First ROTEM 10:42am (altered so only first 10min visible as would occur in clinical practice)



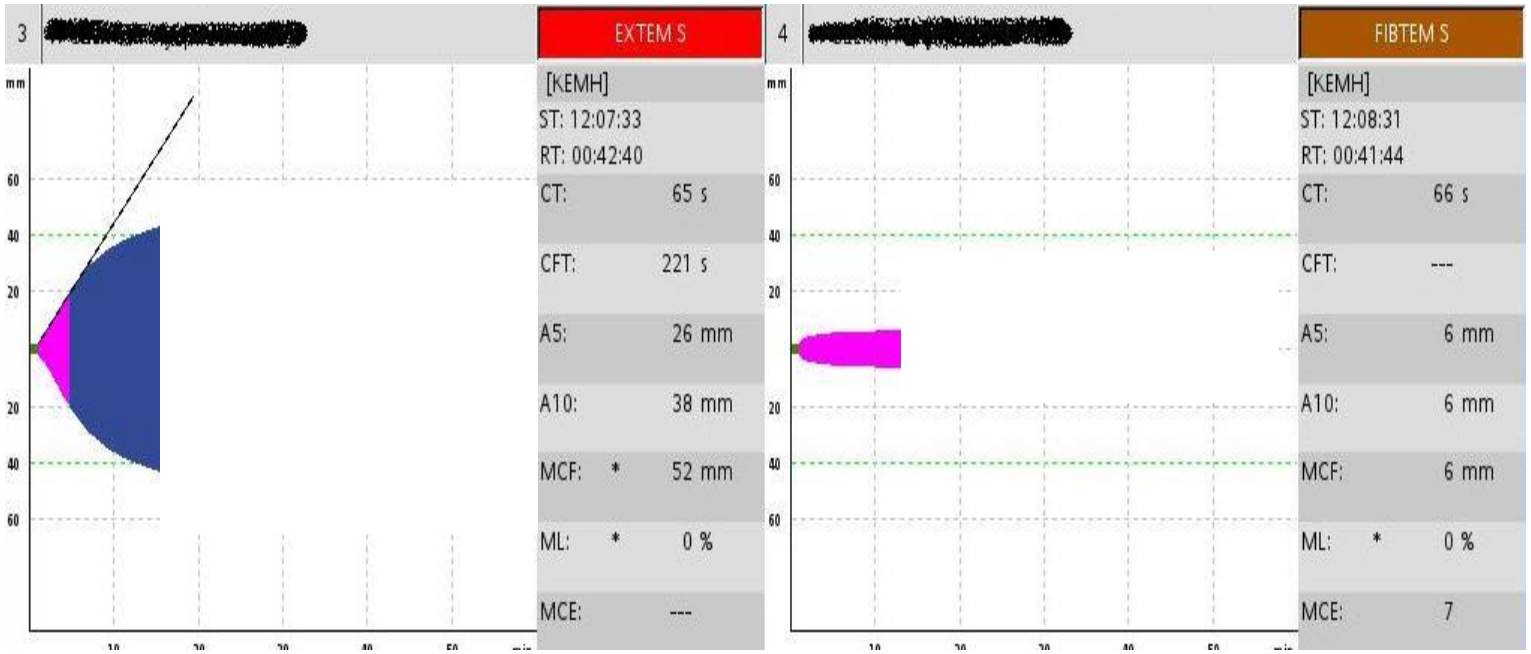
- This case was managed before the introduction of our new algorithm, however pretend it is happening today and practice applying our new algorithm.
- What treatments / blood products will you give ?

CASE 1 – 10:42am



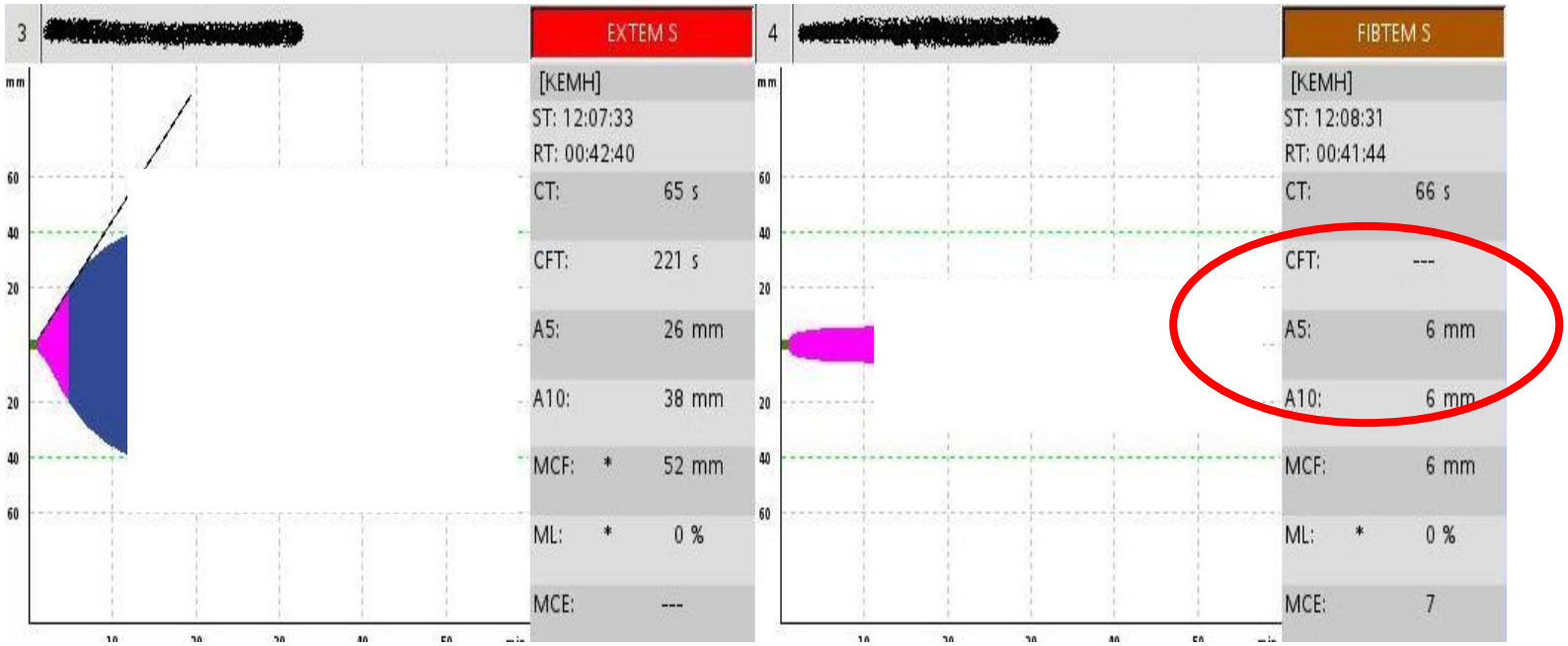
- Typical ROTEM for low fibrinogen
- Fibrinolysis: at 10min you don't want to wait 40min to see if there is fibrinolysis Extem A5 <35 means there is a high likelihood of excess fibrinolysis → give Tranexamic acid.
- Fibrinogen: Fibtem A5 = 4mm – critically low, aim to increase fibtem A5 by 8mm to target of 12mm. This meets the criteria for fibrinogen concentrate (A5<7mm) give 4g FC (or 20units of cryoprecipitate if unavailable).
- Platelets: Extem A5 = 25mm with low fibrinogen (Fibtem A5 <10). Borderline whether to give platelets, the low Extem A5 is probably due to very low fibrinogen. Repeat ROTEM after fibrinogen replacement.
- Factors: Extem CT = 113s, mildly prolonged because of low fibrinogen. Correct this first.

CASE 1 - 12:08am



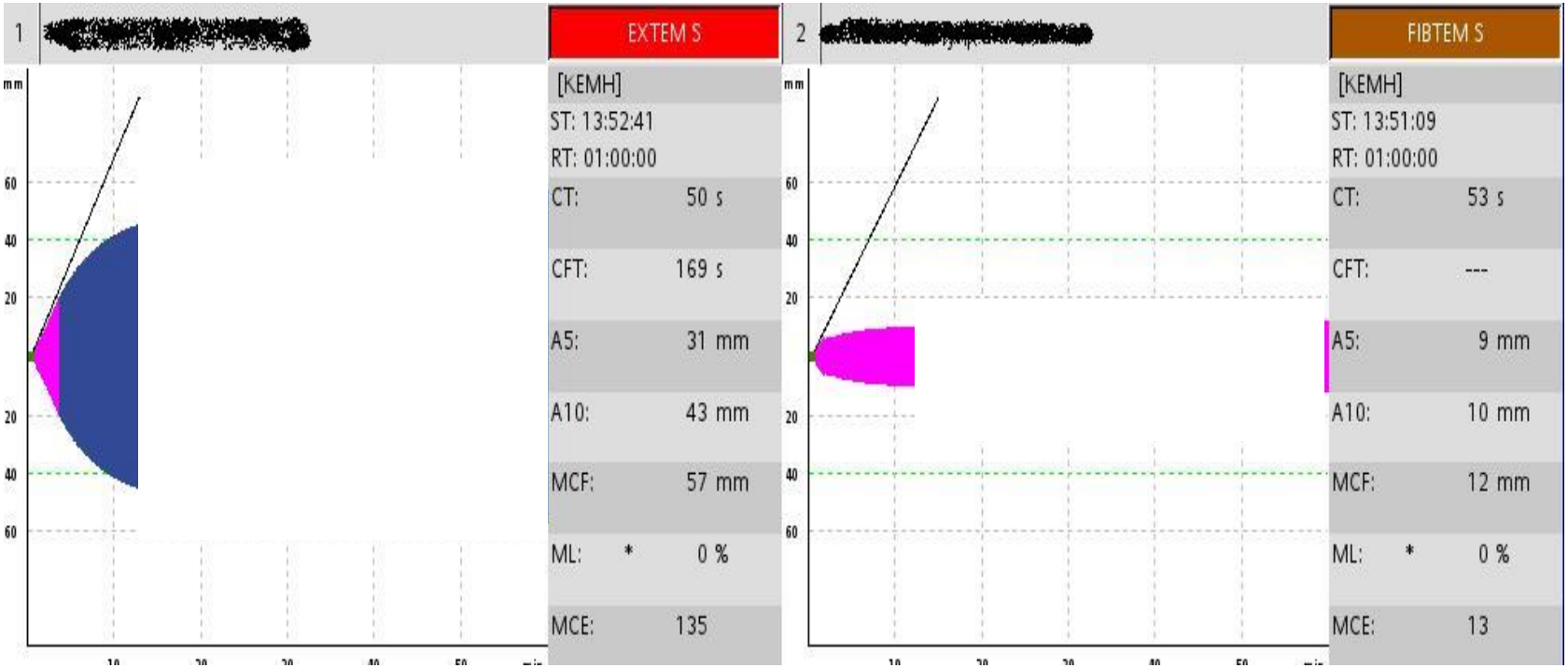
- She actually receives 8 units of cryoprecipitate and has another ROTEM
- 70min have passed by & she is <u>still bleeding</u>
- How would you treat her now? (Use KEMH algorithm again)

CASE 1 - 12:08am



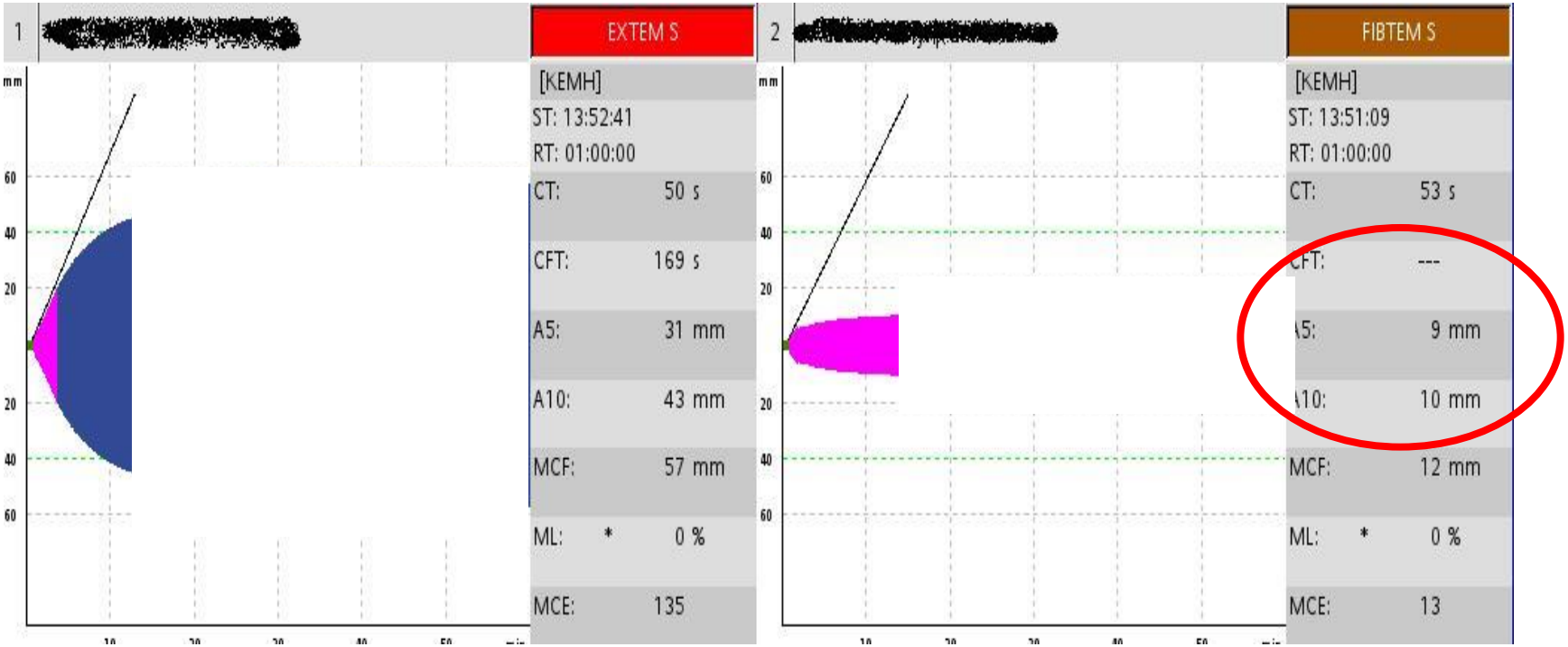
- Fibrinolysis: Extem A5 <35, give TXA 1g if not already given.
- Fibrinogen: Fibtem A5 = 6mm – still very low. It has only increased by 2mm despite 8units of cryo. Aim to increase fibtem A5 by 6mm to 12mm. This still meets the criteria for fibrinogen concentrate give 4g FC (or 20units of cryoprecipitate if unavailable)
- Platelets:Extem A5 = 26mm, still low but just due to very low fibrinogen
- Factors: Extem CT = 65s, this has corrected with cryo alone.

CASE 1 - 13:51



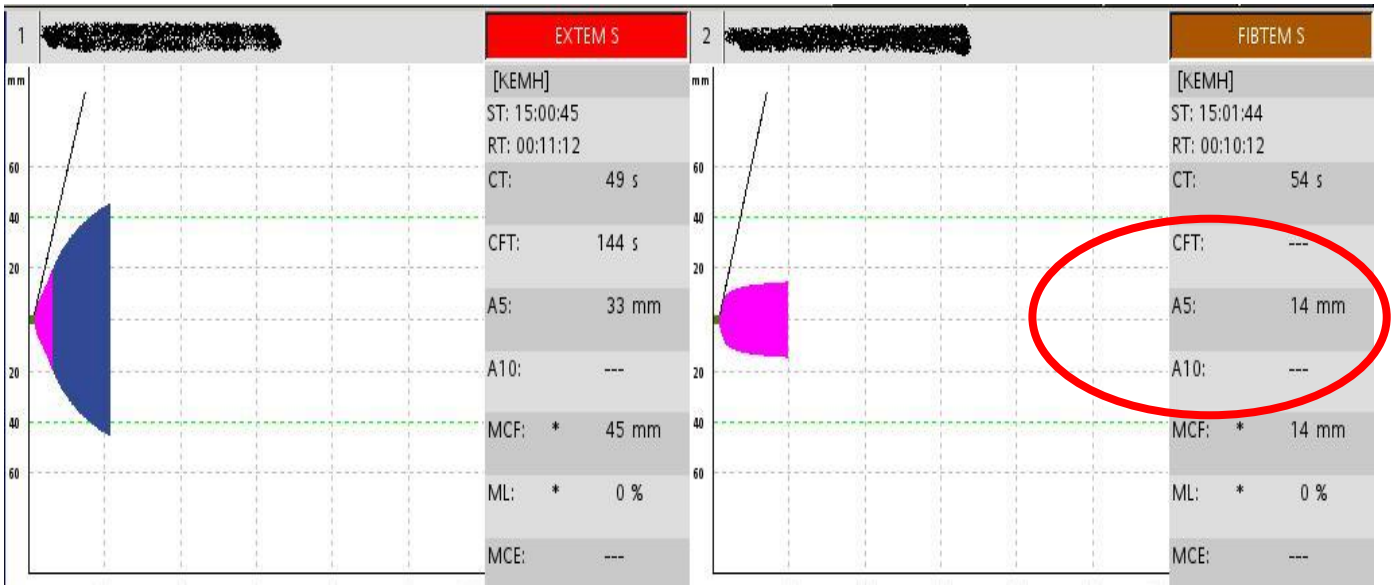
- She actually receives another 16 units of cryoprecipitate and another ROTEM is performed.
- She's still bleeding / oozing, another 100mins have gone past.
- What would you give her now?

CASE 1 - 13:51



- Fibrinolysis: ML = 0% No TXA needed
- Fibrinogen: Fibtem A5 = 9mm – still low. It has only increased by 3mm despite 16units of cryo. She is still bleeding so continue correcting this. Aim to increase fibtem A5 by 3mm to 12mm. This does not meet our criteria for fibrinogen concentrate so give 10 units of cryoprecipitate.
- Platelets: Extem A5 = 31mm, better but still < 35mm just due to low fibrinogen
- Factors: Extem CT = 50s, this is now completely normalised with cryo alone.

CASE 1 - 15:00



- She was now actually then given 2g fibrinogen concentrate (2 ampoules). (The first use at KEMH).
- Her Fibtem A5 increased by 5mm and is now 14mm (above the target of 12mm)
- She has also had a Bakri balloon placed and she now stops bleeding.

It took us over 4 hours

- To get from a fibtem A5 of 4mm – 14mm

- Total blood loss was approx 3litres

- Blood products used:
  - 24units cryoprecipitate
  - 2g of fibrinogen concentrate
  - 2 units red cells