CASE 8

Thanks to Dr Gareth Ansell for sharing this case!

Have a look at the following case and try to interprete the TEG first yourself

You can use either:

1)the TEG6s cheat sheet (on the next two pages).

(* Thanks to the anonymous people who made this cheat sheet)

2) The Mater Hospital TEG interpretation guide

TEG

ALGORITHM

AIMS: CK R <9 mins; CK R = CKH R; CRT MA >52mm; CFF MA >15mm; CRT LY30<2%

RECHECK TEG

1) After products given
2) If bleeding continues

PHYSIOLOGICAL TARGETS

T >36.0
pH >7.2
Ca >1.0
Hb >70 or higher as indicated

THEORY

FOUR TRACES

CK – KAOLIN ACTIVATED
KAOLIN ALONE: traditional TEG trace showing total clotting profile

CRT – RAPID TEG
KAOLIN + TISSUE FACTOR: causes rapid clot formation shortening R time. Fastest to show MA & LY30

CKH – HEPARINASE
KAOLIN + HEPARINASE: removes heparin effect. Otherwise comparable to CK trace.

CFF – FUNCTIONAL FIBRINOGEN
KAOLIN + PLATELET INHIBITOR: shows fibrinogens specific contribution to MA, by inhibiting platelets.

STEP 1: MA Result in ~10-15 mins

CFF MA↓ <15mm

Low CRT MA <52mm &
Low CFF MA <15mm
→ Low fibrinogen definite
→ Low platelets possible
→ Check platelets on FBC
→ Recheck TEG after replacing fibrinogen

CFF MA Normal
CRT MA ↓ <52mm

↓FIBRINOGEN

Often first to deplete

		Cryoprecipitate OR	Fibrinogen Conc
CFF MA	<15mm	10u	2g
	<10mm	20u	4g
	< 5mm	20-30u + TXA	4-6g + TXA

~5u cryo OR ~1g fib conc may raise CFF MA ~2mm

↓PLATELETS

Deficit or Disorder (i.e. antiplatelet)

		Pooled Platelets
CRT MA	<50mm	1u
	<25mm	2u

MA = Maximum Amplitude
STRENGTH of clot formed by FIBRINOGEN crosslinking with PLATELETS

STEP 2 : R Result in ~10-15 mins

CK R >9 mins

CK & CKH R both prolonged to same extent
→ Coagulation defect, but not due to heparin

↓COAG FACTORS
Deficit or Disorder (i.e. anticoagulant)

FFP	OR	Prothrombinex
2-4u		25-50u/kg

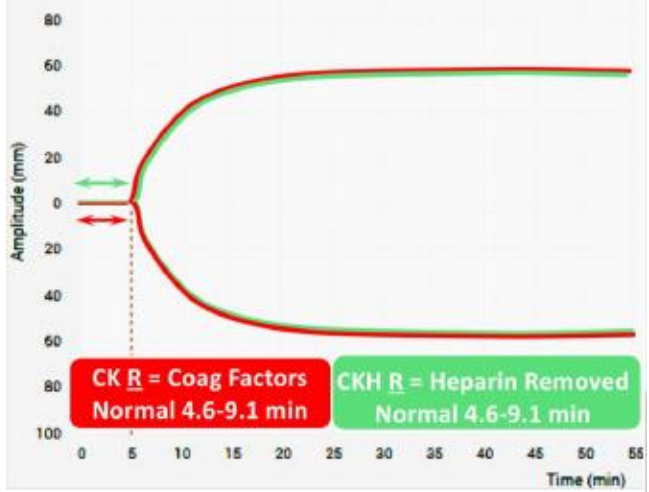
CKH R shorter than CK R

HEPARIN EFFECT

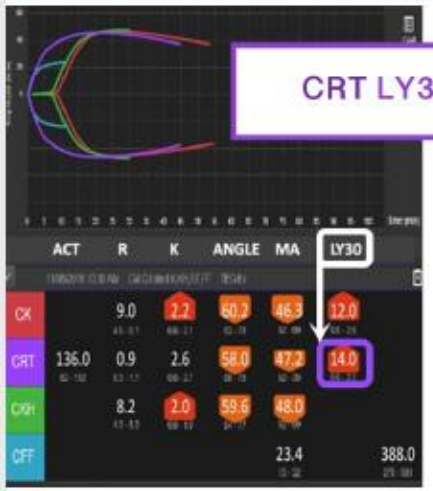
Protamine
~1mg /100u heparin

OR as per local cardiac/bypass protocols

R = Reaction Time
TIME taken for COAGULATION FACTORS to initiate clot formation



STEP 3 : LY30 Result in ~40 -45 mins



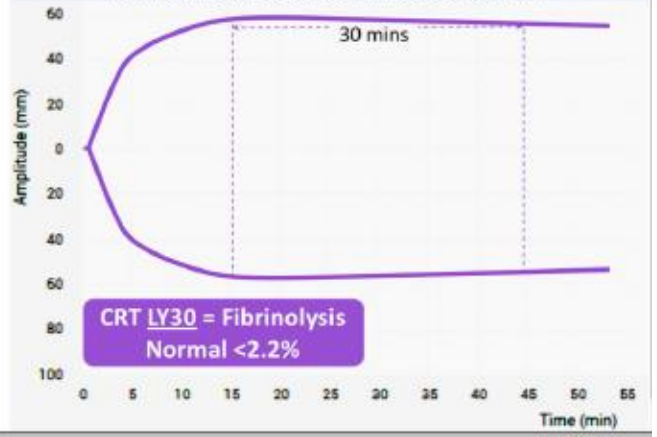
CRT LY30 >2.2%

HYPERFIBRINOLYSIS

Tranexamic Acid (TXA)
1g over 10 mins, followed by 1 g over 8hs

Preemptive Use:
Major trauma, give within 3 hours (CRASH 2)
Consider in surgery where major bleeding occurs or is anticipated

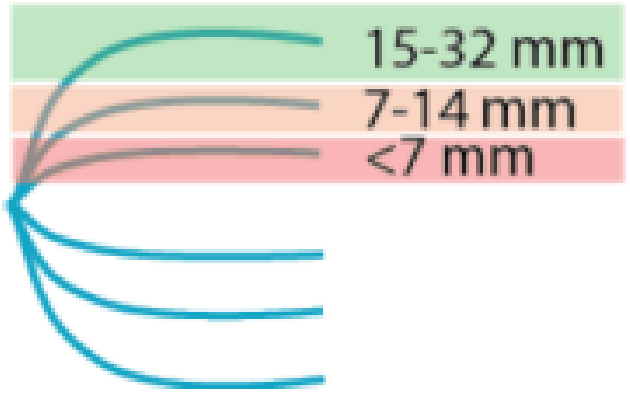
LY30 = Lysis % at 30 mins
STABILITY of clot. Amount of clot broken down by FIBRINOLYSIS at 30 minutes after MA



This algorithm is for educational purposes only and should not be used to interpret patient results in your hospital.

Mater TEG Interpretation

Step 1: Fibrinogen



CFF < 15 – Fibrinogen deficiency

CFF A10 MA 7-14 - low fibrinogen

Action: Give Fibrinogen concentrate 2-4gm

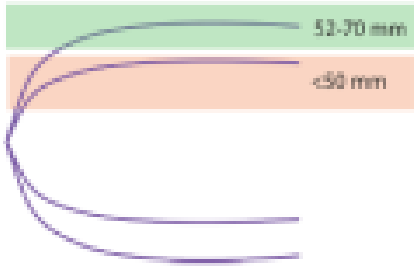
Or cryoprecipitate 1unit/10kg

CFF A10 MA <7mm - critically low fibrinogen

Action: Give Fibrinogen concentrate 4-6gm

NB: Each 1g of fibrinogen concentrate increases CFF MA by approximately 2mm for a 70kg patient

Step 2: Platelets

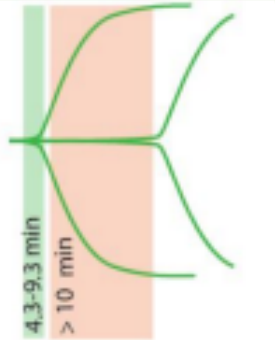


If CFF A10 MA is normal and CRT A10 MA

<50mm - platelet deficiency

Action: Give 1 dose platelets

Step 3: Coagulation Factors

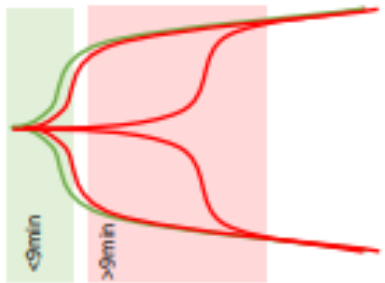


CKHR >9.1 minutes - Coagulation factor deficiency

Action: Give 2 units FFP

Or prothrombinex 25-50units/Kg

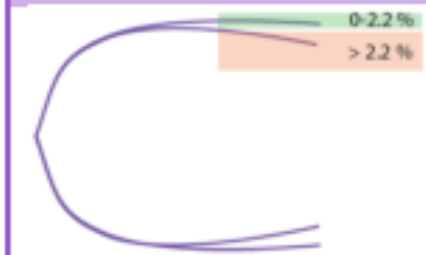
Step 4: Heparin



CKHR normal and CKR >9 minutes (and CK>CKH by >2mm) - consider heparin effect

Action: If heparin given, consider giving protamine 1mg/100units of heparin

Step 5: Fibrinolysis



CRT LY30 >2.2% - hyperfibrinolysis

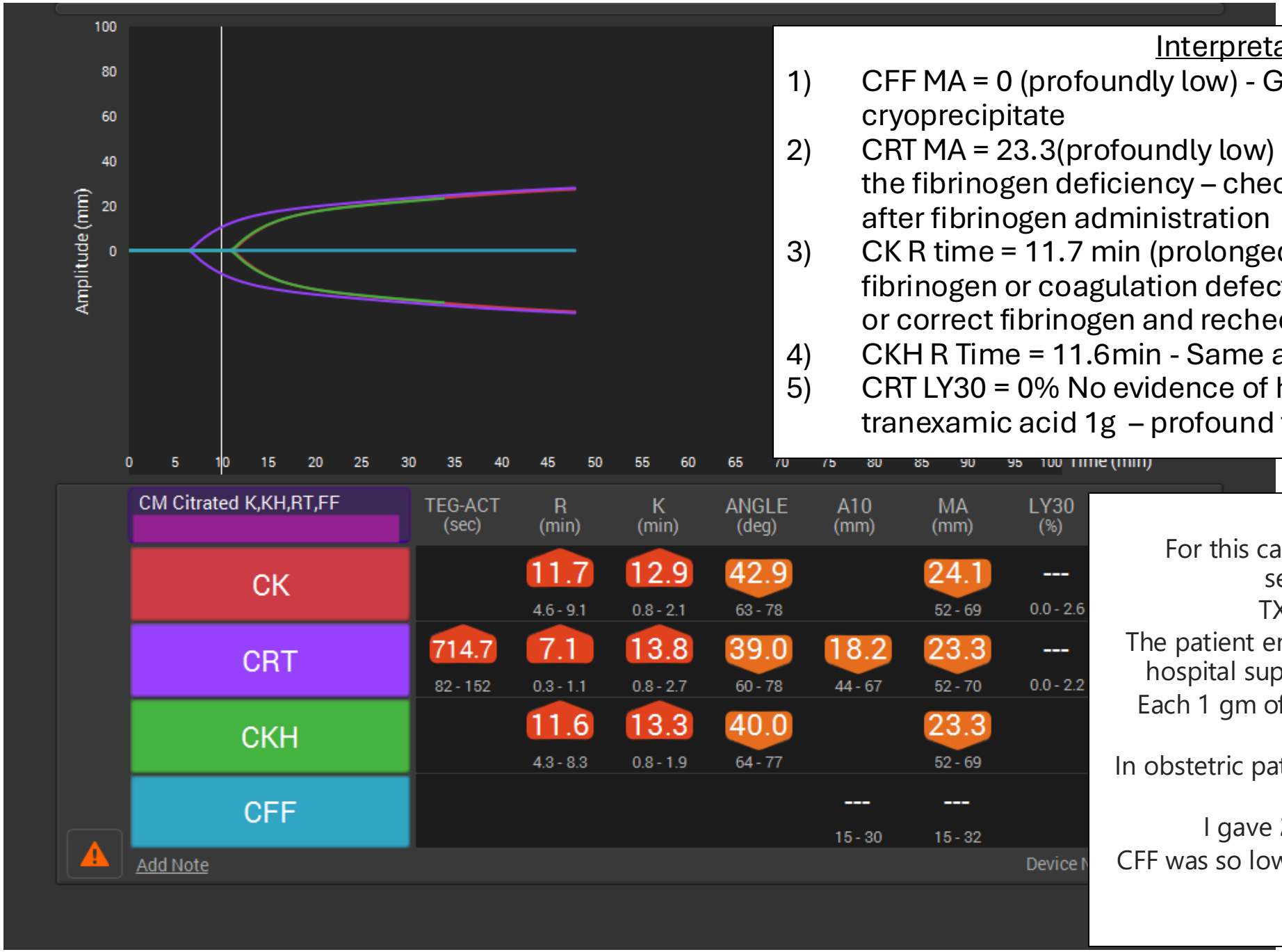
Action: Give 1g Tranexamic acid

Case 8

35 year old female, placental abruption

What does the TEG show?
Try and interprete this yourself first!

What would be your management?



Interpretation

1) CFF MA = 0 (profoundly low) - Give a large dose of fibrinogen or cryoprecipitate
2) CRT MA = 23.3(profoundly low) - Could be due solely to the fibrinogen deficiency – check platelet count or repeat TEG after fibrinogen administration
3) CK R time = 11.7 min (prolonged) – Could be due to lack of fibrinogen or coagulation defect. Consider FFP / Prothrombinex or correct fibrinogen and recheck.
4) CKH R Time = 11.6min - Same as CK R time No heparin effect
5) CRT LY30 = 0% No evidence of hyperfibrinolysis – But give tranexamic acid 1g – profound fibrinogen deficiency

For this case patient has 2 litre blood loss secondary to abruption.

TXA given in birth suite.

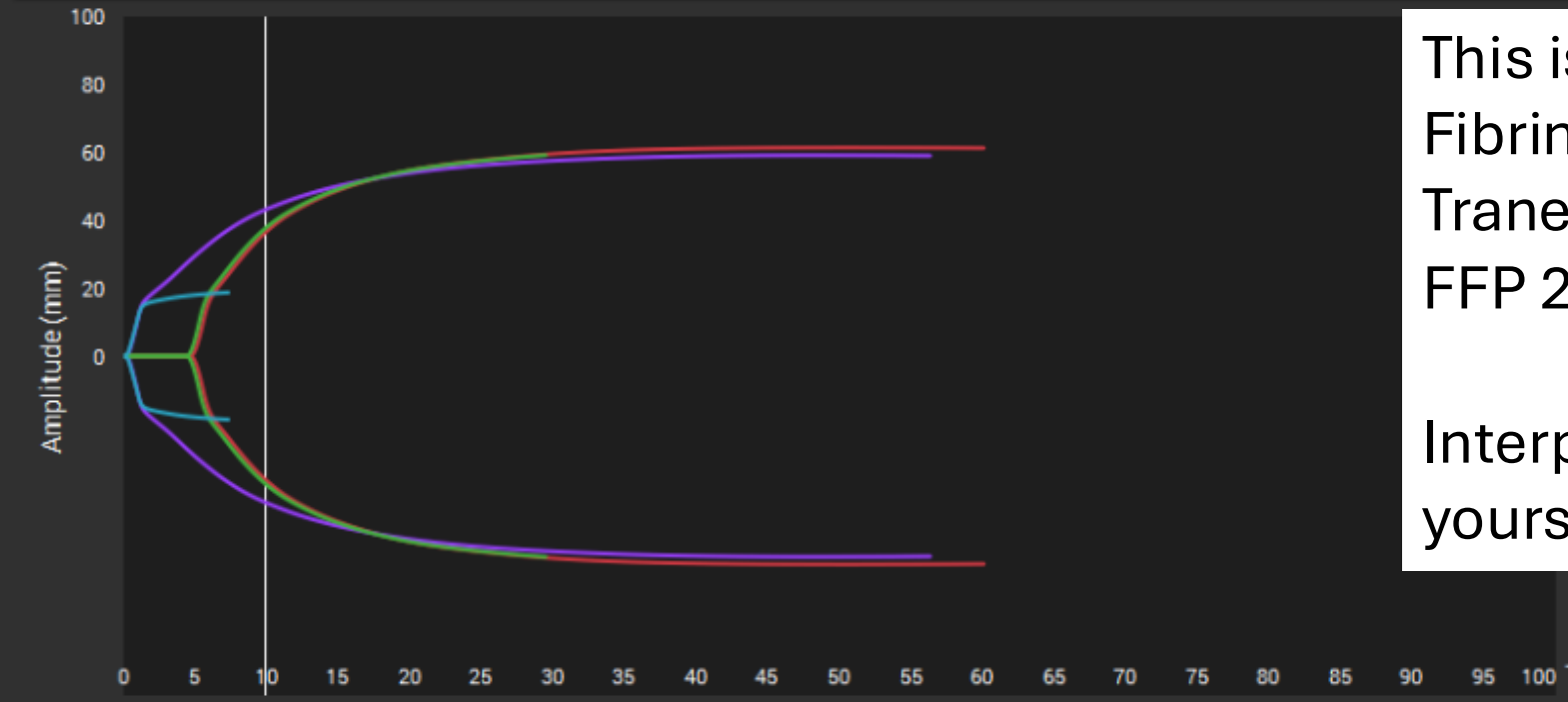
The patient ended up receivng 9g fib conc (total hospital supply and we have 3 g in theatre).

Each 1 gm of fib conc increases CFF by approx 2mm.

In obstetric patients aim CFF greater than 18mm if patient is bleeding.

I gave 2 units FFP and no platelets.

CFF was so low that the CRT MA will increase with fibrinogen alone.



This is the TEG after:
Fibrinogen concentrate 9g
Tranexamic acid 1g
FFP 2 units

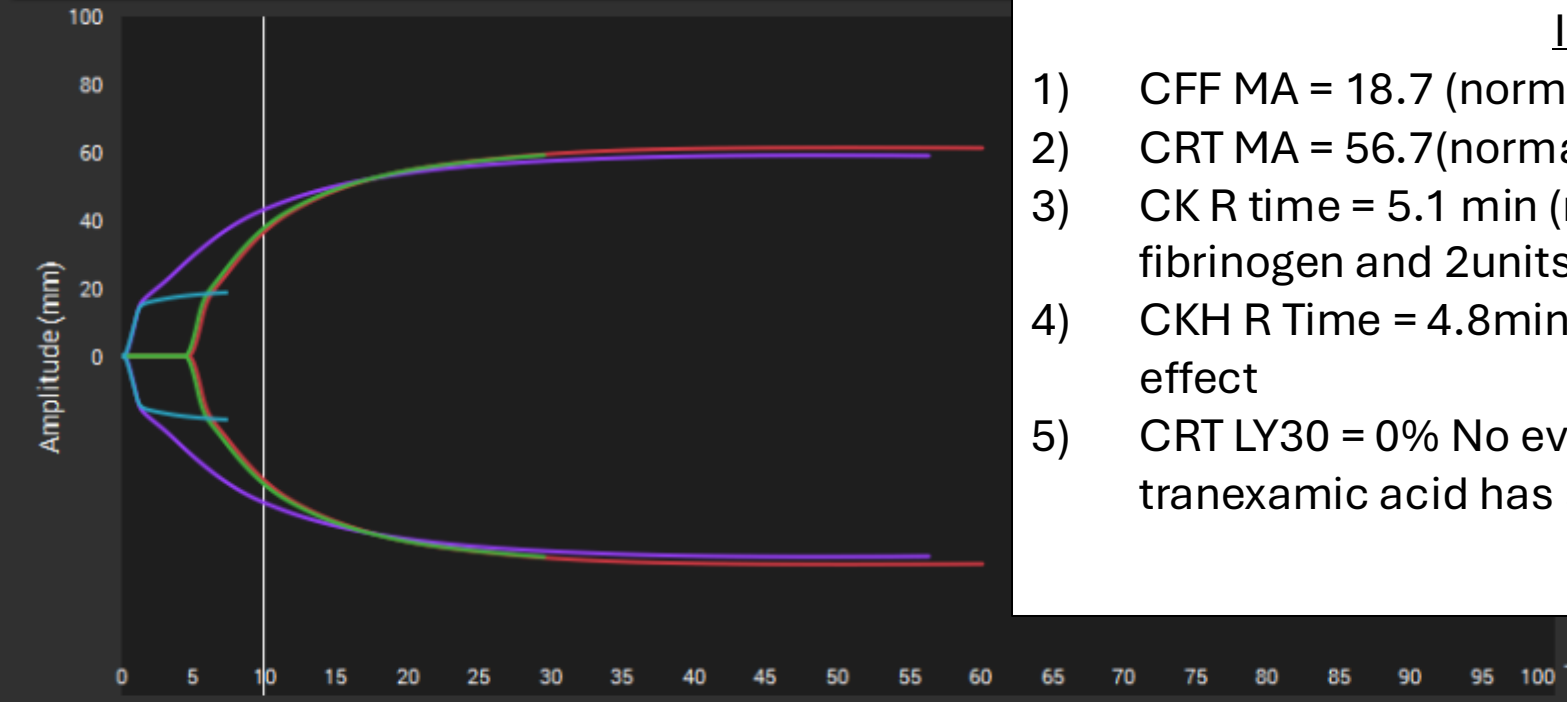
Interprete this TEG now yourself.

CM Citrated K,KH,RT,FF

	TEG-ACT (sec)	R (min)	K (min)	ANGLE (deg)	A10 (mm)	MA (mm)	LY30 (%)
CK		5.1	1.5	73.1		59.6	0.0
		4.6 - 9.1	0.8 - 2.1	63 - 78		52 - 69	0.0 - 2.6
CRT	97.3	0.5	2.0	74.8	44.1	56.7	0.0
	82 - 152	0.3 - 1.1	0.8 - 2.7	60 - 78	44 - 67	52 - 70	0.0 - 2.2
CKH		4.8	1.4	73.5		59.2	
		4.3 - 8.3	0.8 - 1.9	64 - 77		52 - 69	
CFF					*	18.7	
					15 - 30	15 - 32	

Add Note

Device Name: TEG 6s



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		4.3 - 8.3	0.8 - 1.9	64 - 77		52 - 69	
CFF					*	18.7	
					15 - 30	15 - 32	

Add Note

Device Name: TEG 6s

Interpretation

1) CFF MA = 18.7 (normal)
2) CRT MA = 56.7(normal)
3) CK R time = 5.1 min (normal) – This has corrected with 9g fibrinogen and 2units of FFP
4) CKH R Time = 4.8min - Same as CK R time No heparin effect
5) CRT LY30 = 0% No evidence of hyperfibrinolysis - tranexamic acid has already been given

Take Home Points

- Severe coagulopathy can occur rapidly in abruption sometimes even with only modest amounts of blood loss.
- DIC including fibrinolysis / fibrinogenolysis and profound fibrinogen deficiency can occur.
- Viscoelastic testing to recognise and guide treatment is crucial - standard laboratory tests can be misleading
- See our podcast for a discussion of the mechanism of coagulopathy in abruption

130 Coagulopathy in abruption a discussion with Graeme - obsgynaecritcare

Thanks again to Dr Gareth Ansell for sharing this great case!