

The Use of Thromboelastography for Assessment of Coagulopathy in Non-trauma Critically Ill Patients.

Presenter :

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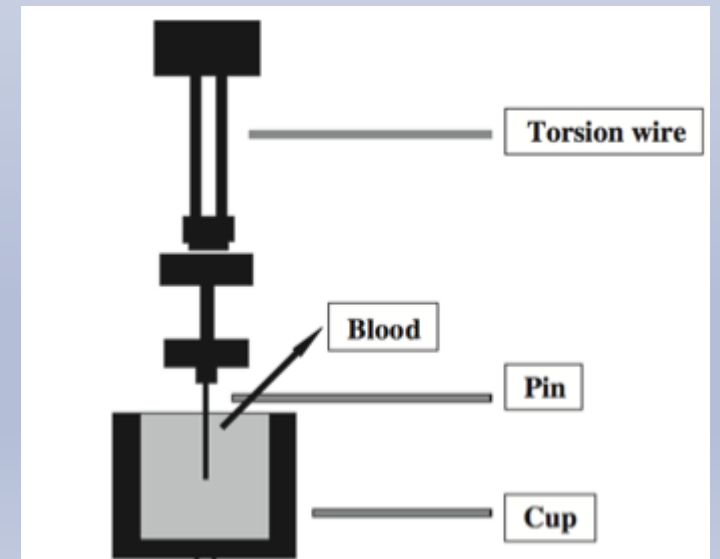
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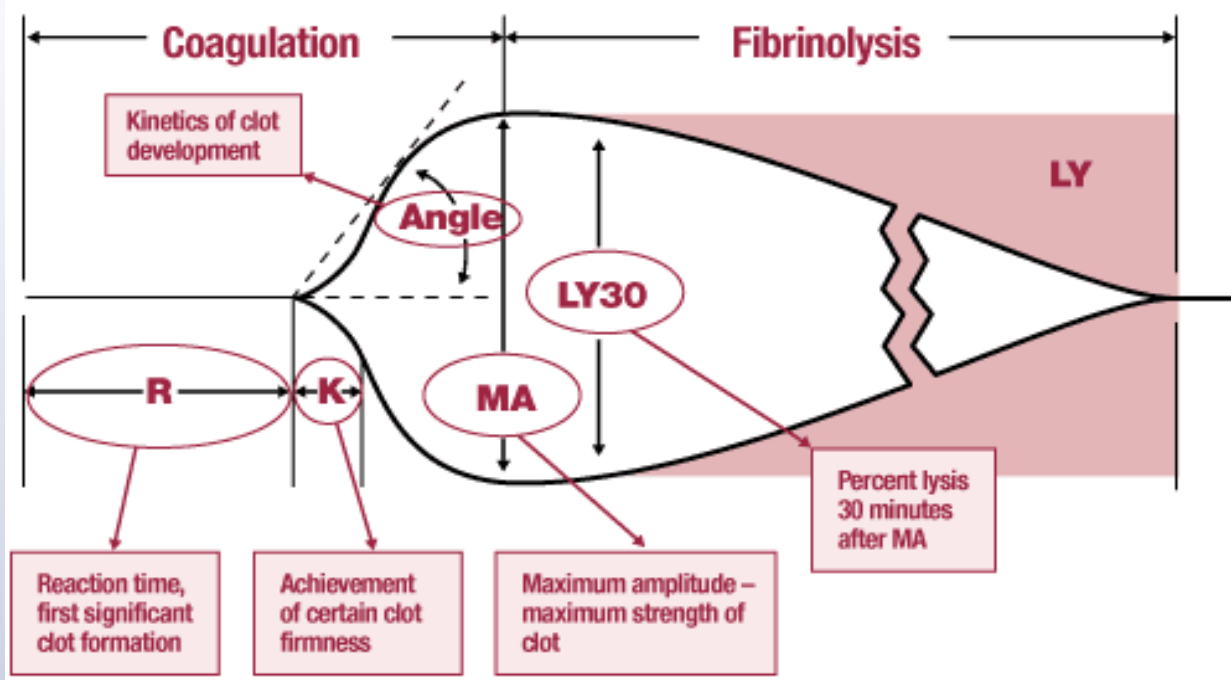
Disclosure Statement

- I, Samid M Farooqui, have no financial disclosures that would be a potential conflict of interest with this presentation.

Background

- TEG provides a graphical representation of the viscoelastic changes that occur during the fibrin polymerization process¹.
- It evaluates the whole mechanics of clot formation and provides a better understanding about the interaction between plasma components and cellular components during clot formation.





Components	Definition	Normal Values	Problem with...	Treatment
R Time	Time to start forming clot	5 – 10 minutes	Coagulation Factors	FFP
K Time	Time until clot reaches a fixed strength	1 – 3 minutes	Fibrinogen	Cryoprecipitate
Alpha angle	Speed of fibrin accumulation	53 – 72 degrees	Fibrinogen	Cryoprecipitate
Maximum Amplitude (MA)	Highest vertical amplitude of the TEG	50 – 70 mm	Platelets	Platelets and/or DDAVP
Lysis at 30 Minutes (LY30)	Percentage of amplitude reduction 30 minutes after maximum amplitude	0 – 8%	Excess Fibrinolysis	Tranexemic Acid and/or Aminocaproic Acid

- TEG gives a functionally relevant insight into the coagulation status of critically ill patients.
- TEG scans are used to guide transfusion in trauma patients and multiple studies have been done to validate its use in trauma patients^{2,3}
- Tartamella F et al.⁴ reported Thrombodynamic ratio to be an independent predictor of the odds of thrombosis in critically ill patients.

Objective

- To determine the utility of TEG scans in the assessment of coagulopathy and risk of bleeding in non-trauma, critically ill patients. .

METHODOLOGY

- Critically-ill patients admitted to the medical ICU with abnormalities in standard coagulation panel.
- Comparison between patients with normal vs. abnormal TEG panel.
- Retrospective cohort analysis.

- Primary outcome: Development of a bleeding-related event (composite of major bleed, drop in hemoglobin or need for PRBCs transfusion)

- **Inclusion Criteria**

- Critically Ill adult patients with an abnormal DIC panel.

- **Exclusion Criteria**

- Patients bleeding on admission
- Patients receiving anti-coagulation on admission
- Patients who received blood products before TEG scan analysis.

RESULTS

50 patients screened

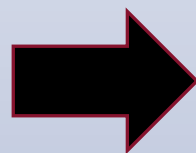
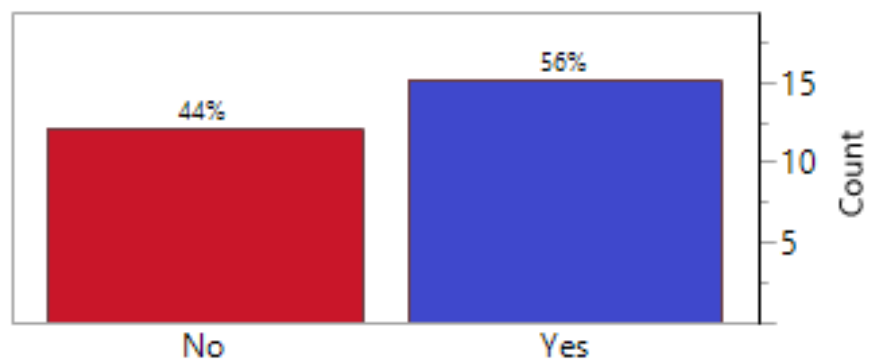
23 patients excluded:

- 14 Major bleed on admission
- 7 Use of anticoagulants on admission
- 3 Others

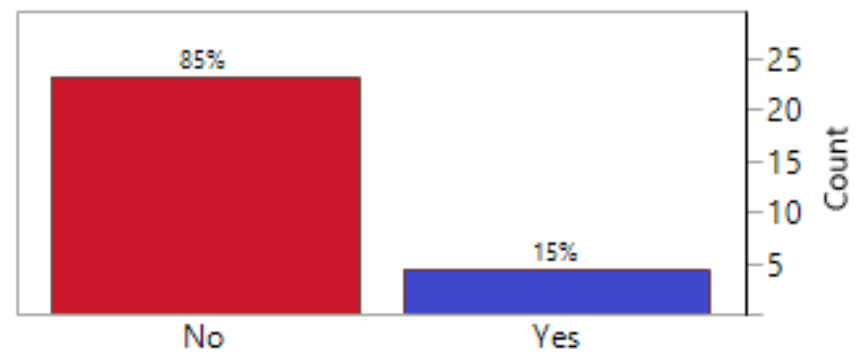
27 patients included

Demographics	
Age	61.07 ± 2.50
Sex (male, %)	17 (63%)
Co-morbidities	
Chronic liver disease	4 (15%)
Standard metrics	
Hb	9.85 ± 0.38
Platelet count	105.33 ± 16.92
Prothrombin time	26.13 ± 4.12
INR	3.05 ± 0.83
Partial thromboplastin time	39.41 ± 1.98
Fibrinogen	258.31 ± 31.45
D-dimer	5095.93 ± 1620.35
TEG metrics	
Time difference (minutes)	165.11 ± 36.35
R time	6.79 ± 0.62
K time	3.27 ± 0.68
α angle	58.79 ± 2.65
Maximum amplitude	53.43 ± 2.62
G time	6.72 ± 0.70
LY 30	0.50 ± 0.28

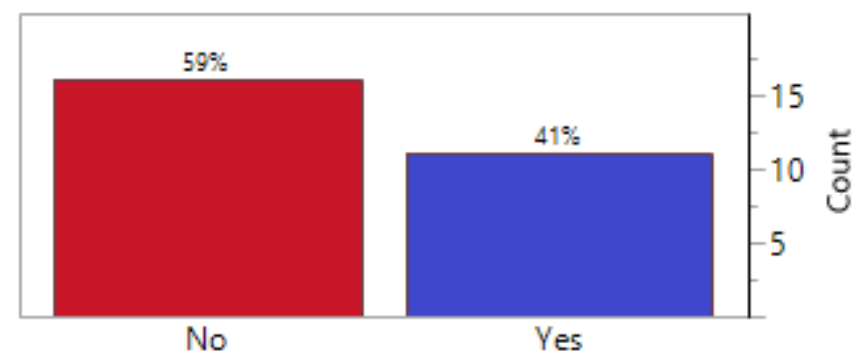
Clinically significant event



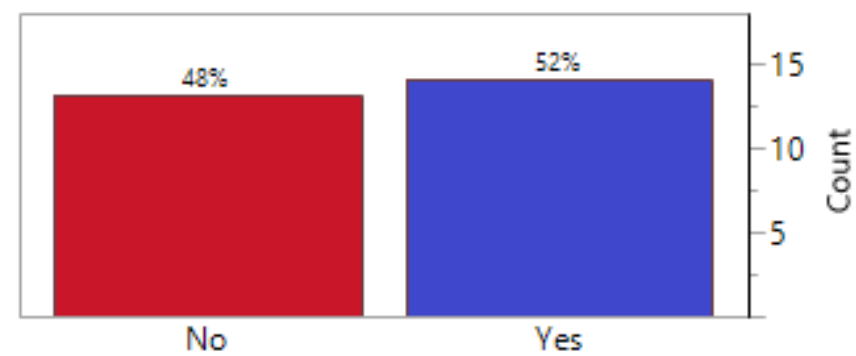
Major site bleed



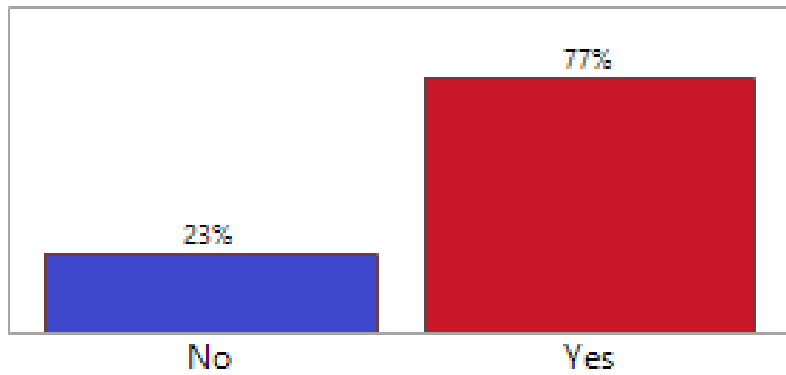
Hb drop



PRBCs required



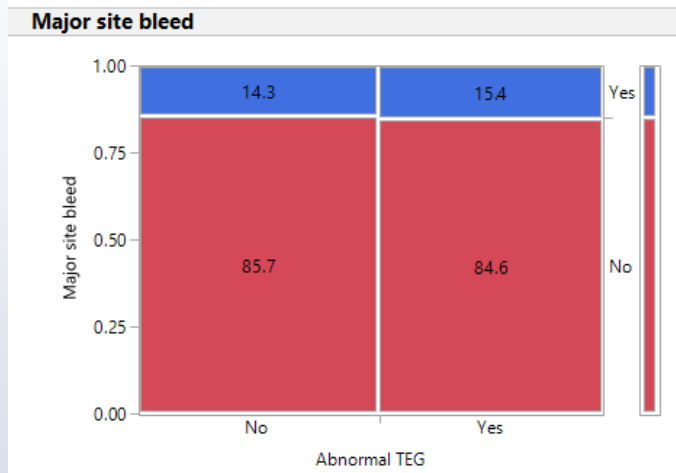
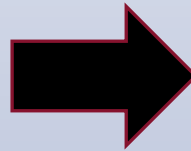
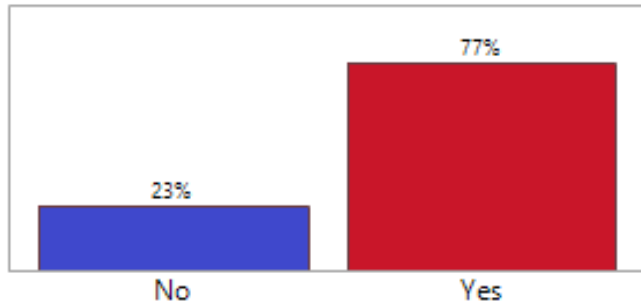
Clinically significant event in patients with abnormal TEG



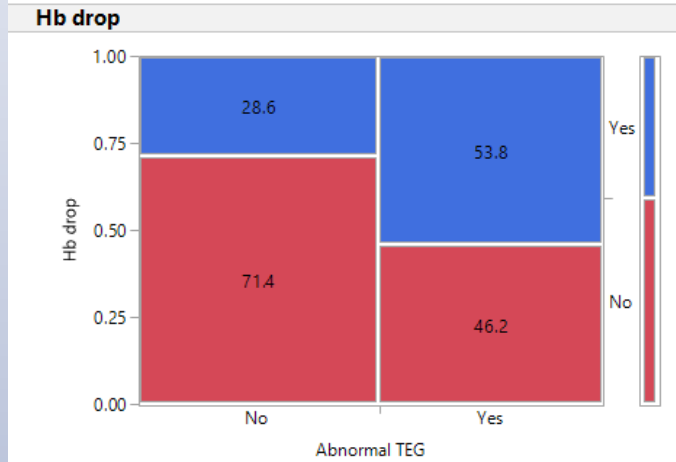
Relative risk = 2.15 (CI 1.0-4.62)

$p = 0.0377$

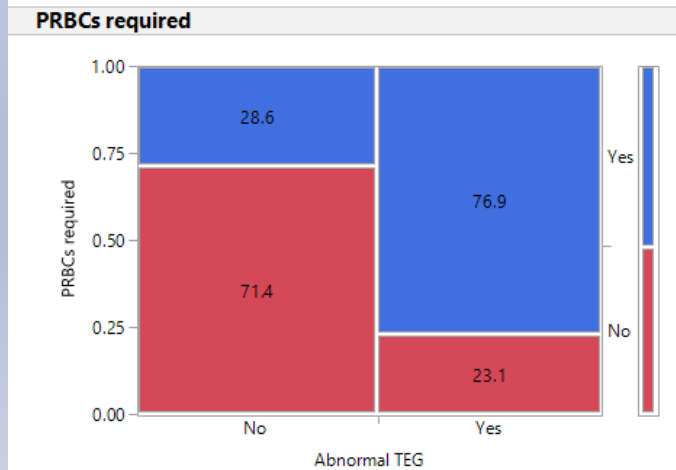
Clinically significant event in patients with abnormal TEG



RR = 1.07
p = 0.6733

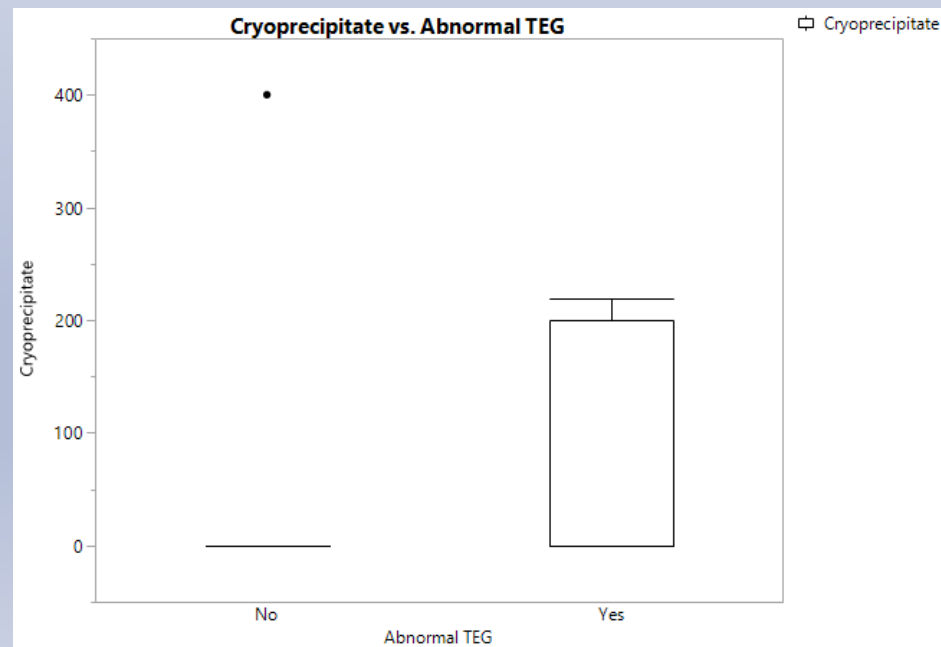
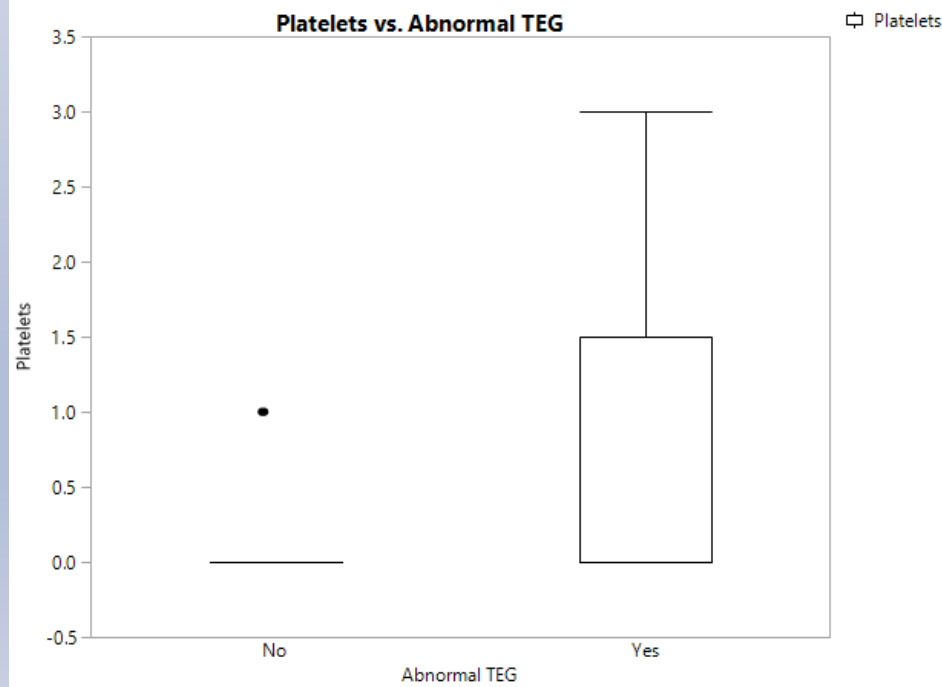
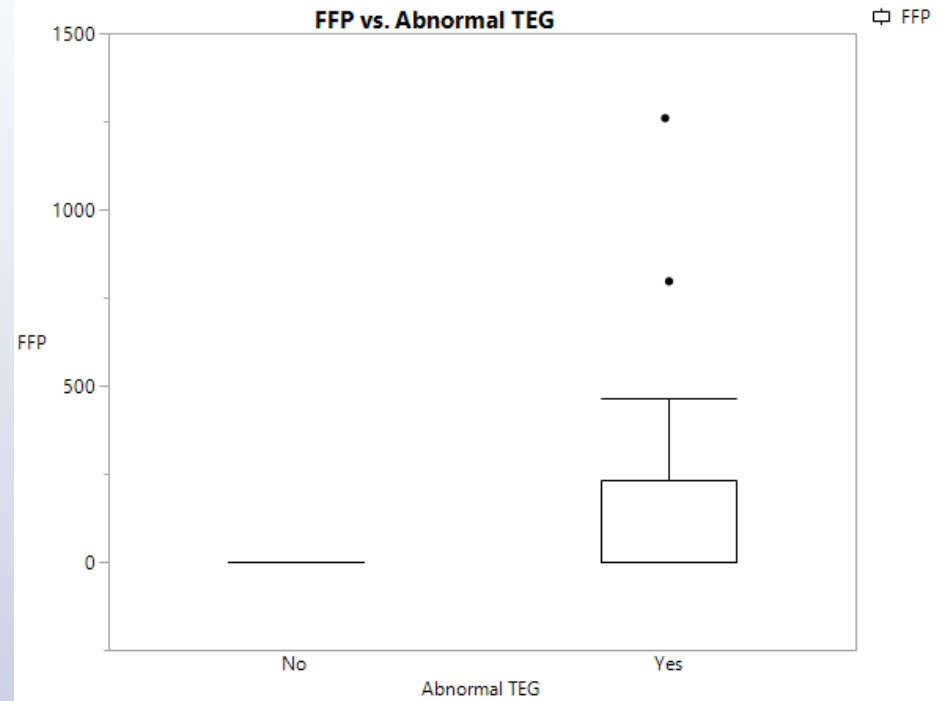
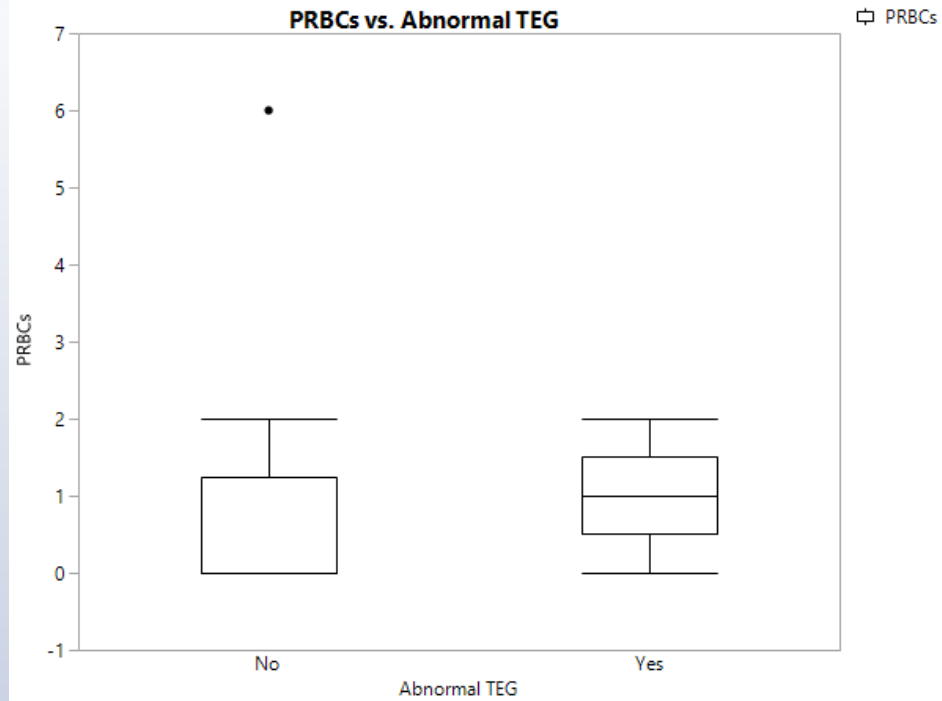


RR = 1.88
p = 0.17



RR = 2.69
p = 0.0157

	Normal TEG (n=14)	Abnormal TEG (n=13)	
Age	60.29 ± 3.72	61.92 ± 3.46	
Gender (male, %)	8 (57%)	9 (69%)	
Standard metrics			
Hb	10.36 ± 0.66	9.3 ± 0.27	
Platelet count	132.64 ± 22.46	75.92 ± 23.68	p = 0.0473
Prothrombin time	25.75 ± 5.77	26.55 ± 6.12	
INR	3.72 ± 1.54	2.33 ± 0.50	
Partial thromboplastin time	36.96 ± 2.39	42.05 ± 3.14	
Fibrinogen	324.15 ± 43.44	192.46 ± 38.88	p = 0.0167
D-dimer	2952.64 ± 941.22	7404.08 ± 3150.43	
TEG metrics			
Time difference (minutes)	215.43 ± 51.70	110.92 ± 48.55	
R time	5.59 ± 0.53	8.08 ± 1.08	
K time	1.62 ± 0.14	5.04 ± 1.25	p = 0.0091
α angle	68.04 ± 1.56	48.84 ± 3.59	p < 0.0001
Maximum amplitude	61.79 ± 2.30	44.42 ± 3.41	p = 0.0002
G time	8.79 ± 0.91	4.49 ± 0.69	p = 0.0005
LY 30	0.26 ± 0.12	0.75 ± 0.56	



DISCUSSION

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- Abnormal TEG cohort had a higher incidence of bleeding-related events.
 - A significantly higher number of patients in the abnormal TEG cohort required transfusion of PRBCs.
 - There seems to be a trend towards a higher need of blood products in the abnormal TEG cohort.

CONCLUSION

- There is a difference between the incidence of clinically significant bleed and TEG (normal or abnormal).
- Patients with abnormal TEGs require more PRBC transfusions than those with normal TEGs.
- Lloyd-Donald et al ⁵ compared TEG scans in acutely ill Chronic Liver Disease patients with TEG scans from normal patients and concluded that there was “delayed clot formation and weaker thrombus strength despite decreased clot lysis”.

LIMITATIONS

- Single center
- Retrospective data
- Small sample size

Future directions

- Prospective analysis
- Data in patients with chronic liver disease

Acknowledgements

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References

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