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Deaconess REGIONAL TRAUMA CENTER

ROTEM (Thromboelastometry)

Purpose: To provide a guideline for Rotational Thromboelastometry (ROTEM) in the assessment and management of coagulation in trauma patients

Definitions:

Rotational Thromboelastometry (ROTEM) is a point-of-care viscoelastic assay that evaluates the quality of hemostasis by measuring The mechanical properties of forming blood clot. It is designed to support patient blood management by providing a comprehensive assessment of clot formation, clot strength, and fibrinolysis.

ROTEM rapidly evaluates the entire coagulation process, from clot initiation through clot stabilization and eventual clot breakdown (fibrinolysis).

Unlike conventional coagulation test, ROTEM analyzes whole blood, allowing assessment of the interaction among platelets, coagulation factors, fibrinogen, red blood cells, and other components involved in hemostasis. With this information clinicians can:

1. Assess clot initiation
2. Evaluate clot strength and stability
3. Identify abnormal fibrinolysis
4. Guide targeted blood component and hemostatic therapy

Guidelines:

A. For trauma patients requiring the activation of Massive Transfusion Protocol (MTP), a ROTEM assay must be included in the MTP order set at the time of activation.
A ROTEM specimen may be collected at any point during the MTP. However, collection is recommended upon completion of the MTP to assess hemostatic status and guide the need for additional targeted blood component or hemostatic therapy.
   a. Trauma ROTEM panel includes EXTEM and FIBTEM

B. Specimen collection
   a. Specimen Requirements

i. Collect the specimen in a blue top tube
ii. ROTEM testing cannot be added on to coagulation studies

b. Collection Methods
Specimen can be collected via venipuncture or line draw
1. Venipuncture using a 23 gauge needle or larger
a. Discard (waste) at least 2 ml of blood
2. Line draw only from line that is not heparinized
a. Discard (waste) at least 2 ml of blood

c. Specimen Transport
i. Hand-deliver the specimen to the laboratory
ii. Do not send specimen through the pneumatic tube system

C. ROTEM results can be viewed remotely in real time using the ROTEM link on the Epic Dashboard.
a. The test will be viewable remotely for 60 minutes until test is completed
b. Once test is completed, image will be printed and scanned into EPIC in Results Review where labs are located

D. Refer to Appendix A for ROTEM TEMOGRAM

E. Refer to Appendix B for ROTEM Algorithm

References:

- American College of Surgeons (ACS). (2022). Resources for Optimal Care of the Injured Patient.
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- Lier, H., Bottiger, B., Hinkelbein, J., Krep H., & Bernhard. (2011). Coagulation management in multiple trauma: A systematic review. Intensive Care Medicine, 37, 572-582. doi: 10.1007/s00134-011-2139-y
- ROTEM rep PowerPoint. (2018). ROTEM 101: Basics of interpretation and clinical application
- ROTEM at Parkland Trauma. (2018). Trauma algorithm. Retrieved from http://rotatetrial.com/rotemPMH.html
- Tanaka, K., Bollger, D., Vadlamudi, R., & Nimmo, A. (2012). Rotational thromboelastometry (ROTEM)-based coagulation management in cardiac surgery and major trauma. Journal of Cardiothoracic and Vascular Anesthesia, 26, 1083-1093. doi: 10.1053/j.jvca.2012.06.015

Basic Principles of Temogram:

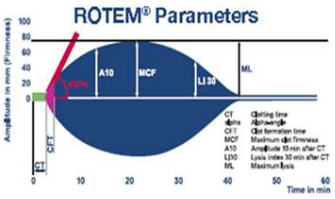
ROTEM® CHECKPOINT

What's the Temogram Shape?

- Wine Glasses ➔ Good
- Bullets ➔ Bad
- The Greater the Amplitude the Firmer the Clot

Evaluate

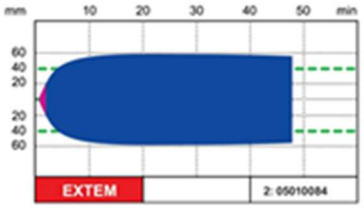
- **ML** – Clot Stability / Lysis (consider TXA)
- **A10** – Amplitude for Clot Strength (consider Plts & Fibrinogen)
- **CT** – Thrombin Generation (consider FFP, PCCs Protamine)



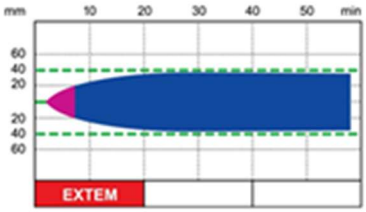
Assay Panels

- **INTEM** – Intrinsic
- HEPTEM – Heparin Effect?
- **EXTEM** – Extrinsic
- **FIBTEM** – Fibrin Contribution
- **APTEM** – Pathologic Lysis?

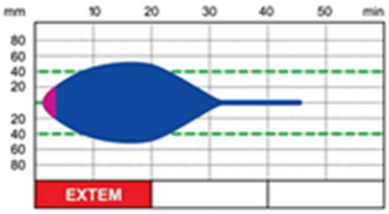
Overview of Temogram Shapes:



Firm & Stable
(Wine Glass Shape)



Relatively Weak
(Bullet Shape)



Unstable
(Fish Shape)

Normal Factors:

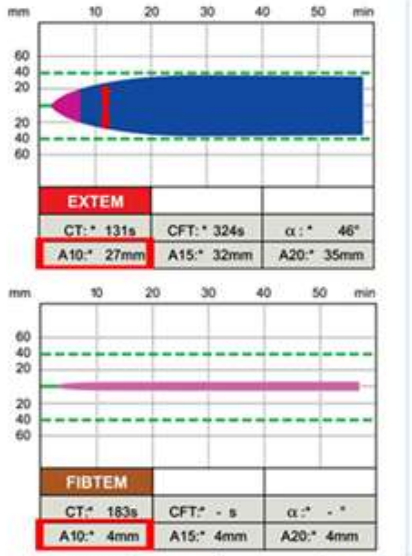
Factors	EXTEM	FIBTEM
CT	43 – 82 seconds	
A10	40 – 60 seconds	7 – 10 mm
A20	50 – 70 seconds	7 – 24 mm
ML	15% or less	

CT: Coagulation Time (in seconds)
A10, A20 Amplitude 10 minutes and 20 minutes after CT (in mm)
ML: Maximum Lysis (percentage of lysis at any time)

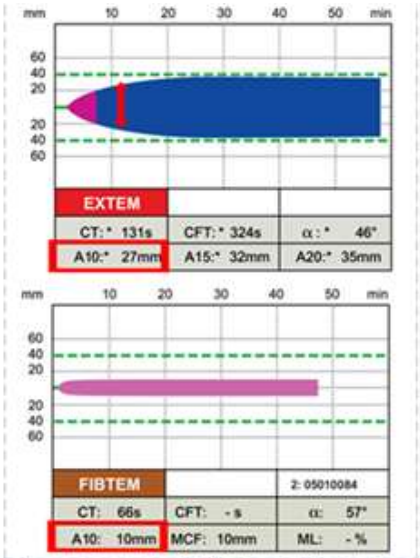
Observe the ROTEM TEMOGRAM:

A. Look at the CT in the EXTEM
    a. If the CT is greater than 80 seconds, the patient needs FFP
B. Look at the A10 in the EXTEM
    a. If the A10 in the EXTEM is less than 40mm, look at the A10 in the FIBTEM
        i. If the A10 in the FIBTEM is less than 10mm, the patient needs Cryoprecipitate (Cryo)
        ii. If the A10 in the FIBTEM is 10mm or greater, the patient needs platelets
C. Look at the ML in the EXTEM
    a. If the ML is 15% or greater, look at the shape
        i. If there is a “fish shape” in *both* EXTEM and FIBTEM, the patient needs TXA

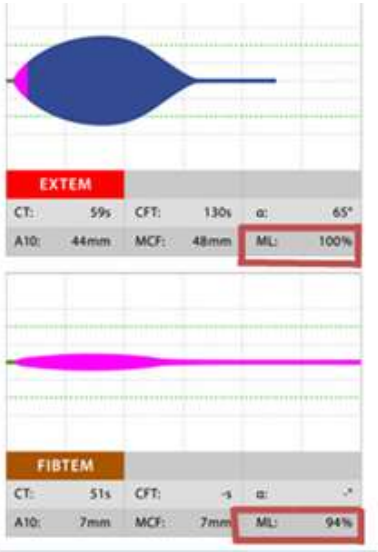
Three Examples:



Suggests inadequate fibrin contribution to clot firmness. Pt needs cryo.



Suggests adequate fibrin contribution to clot firmness. Pt needs platelets.



Suggests hyperfibrinolysis. Pt needs TXA.

ROTEM Algorithm