

PRACTICE GUIDELINE

Effective Date: 5-1-18

Manual Reference: Deaconess Trauma Services

TITLE: ROTEM

PURPOSE: To provide a guideline for Rotational Thromboelastometry (ROTEM)

BACKGROUND: ROTEM is a method of measuring hemostasis quality via the viscoelastic properties of a blood clot and is designed for patient blood management. ROTEM provides a rapid assessment of clot development from secondary hemostasis to clot lysis by evaluating clot formation, clot firmness, and clot fibrinolysis. ROTEM provides a global assessment of hemostasis by using a whole blood sample to demonstrate how platelets, coagulation factors, RBCs, and other elements are working together to 1) initiate a clot, 2) determine clot strength, and 3) investigate if there is any fibrinolysis.

BASIC PRINCIPLES OF TEMOGRAM:

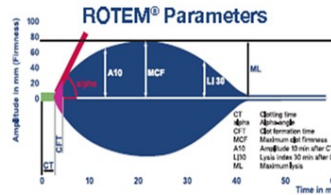
ROTEM® CHECKPOINT

What's the Temogram Shape?

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

Evaluate

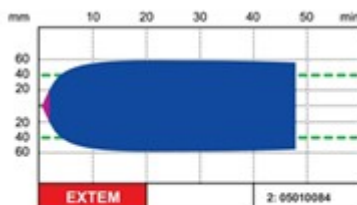
- **ML** – Clot Stability / Lysis (consider TXA)
- **A10** – Amplitude for Clot Strength (consider Plts & Fibrinogen)
- **CT** – Thrombin Generation (consider FFP, PCCs Protamine)



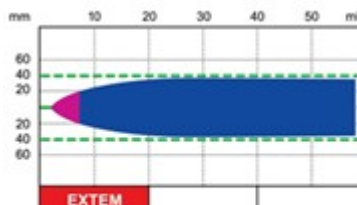
Assay Panels

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

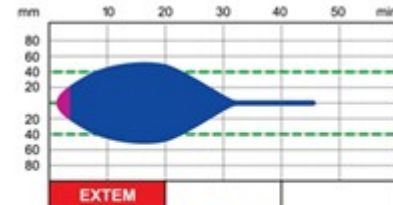
OVERVIEW OF TEMOGRAM SHAPES:



Firm & Stable
(Wine Glass Shape)



Relatively Weak
(Bullet Shape)



Unstable
(Fish Shape)

NORMAL FACTORS:

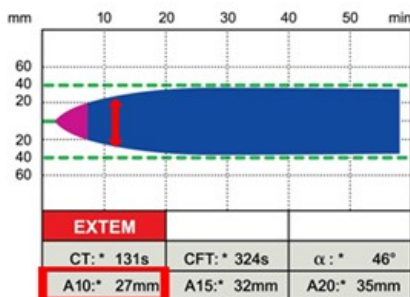
FACTORS	EXTEM	FIBTEM
CT	43-82 seconds	
A10	40-60	7-10 mm
A20	50-70 mm	7-24 mm
ML	15% or less	

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)

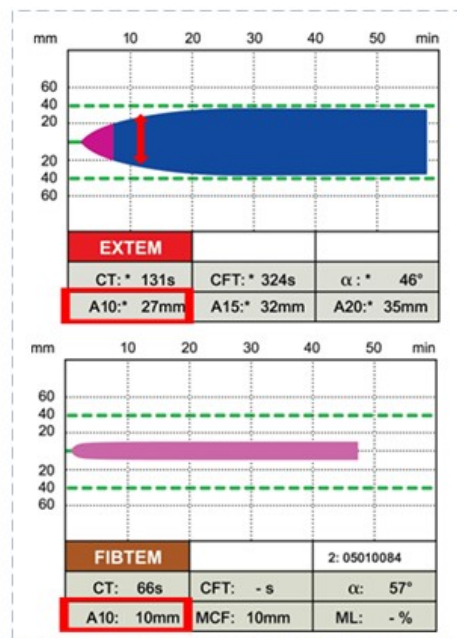
OBSERVE THE ROTEM TEMOGRAM:

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

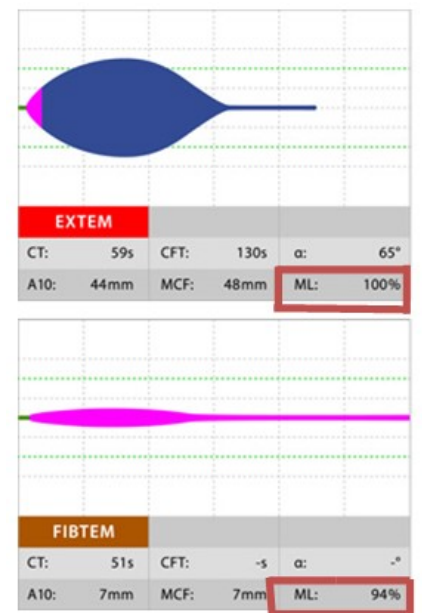
THREE EXAMPLES:



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.

GUIDELINES:

1. In the event a trauma patient requires Massive Transfusion Protocol, a ROTEM should be ordered
 - a. ROTEM Trauma panel will include: EXTEM and FIBTEM
 - b. There are other assay tests available
 - i. Comprehensive ROTEM Panel: INTEM, EXTEM, FIBTEM, APTM
 - ii. Heparin ROTEM Panel: HEPTM and INTEM
 - a) Order if suspicious for heparin involvement
 - b) If INTEM CT is >208 seconds and HEPTM CT is <208 seconds, suggests a heparin effect or too much heparin, or an enzyme factor deficiency
2. Specimen collection
 - a. Specimen must go in a blue top tube and cannot be added on to coagulation studies
 - i. Specimen can be collected via stick or draw
 - a) Stick must be with a 23 gauge needle or larger and waste at least 2ml of blood
 - b) Draw from line with no heparin and waste at least 2ml of blood
 - ii. Specimen must be hand delivered to lab. CANNOT use tube system
3. View results remotely in real time using the ROTEM link on the Epic Dashboard
 - a. Test will be viewable remotely for 60 minutes until test is completed
 - b. Login and Password for the system are the same as the Epic Login/Password
 - c. Once test is completed, image will be printed and scanned into Epic in Results Review where labs are located
4. Refer to Appendix for ROTEM Algorithm

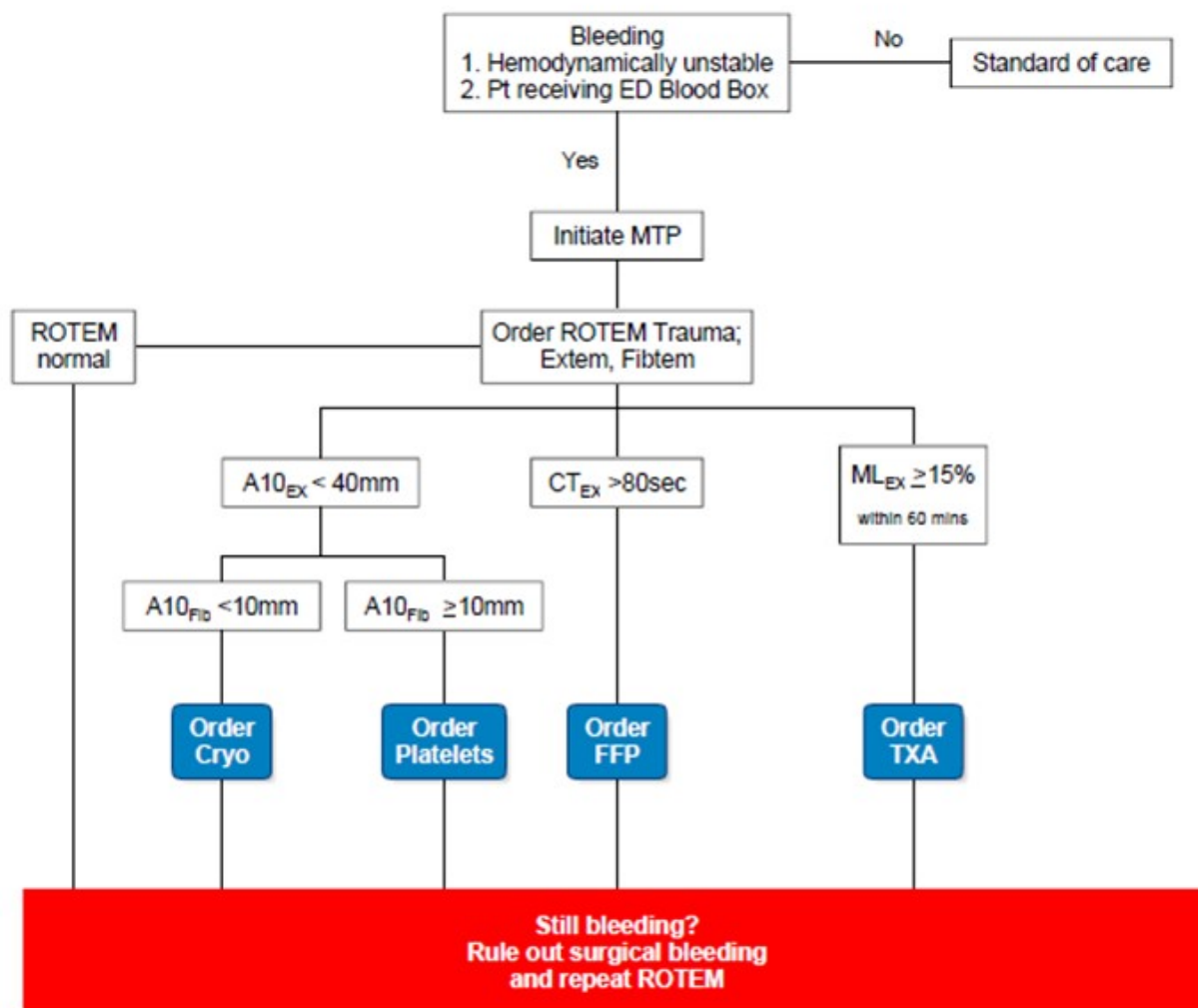
REFERENCES:

- ❖ American College of Surgeons. (2014). *Resources for Optimal Care of the Injured Patient*.
- ❖ Leemann, H., Lustenberger, T., Talving, P., Kobayashi, L., Bukur, M., Brenni, M., Bruesh, M., Spahn, D. R., & Keel, M. J. (2010). The role of rotation thromboelastometry in early prediction of massive transfusion. *The Journal of Trauma, Injury, Infection, and Critical Care*, 69, 1403-1409. doi: 10.1097/TA.0b013e3181faa25
- ❖ 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

REVIEWED DATE	REVISED DATE
JAN 19	
MAY 20	

Appendix

ROTEM Algorithm



NOTES:
Specimen goes in a blue top.
Do not use tube system.
Hand deliver to lab.