Created: May 2018

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Deaconess REGIONAL TRAUMA CENTER

ROTEM

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

Definitions:

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.

Guidelines:

A. In the event a trauma patient requires Massive Transfusion Protocol (MTP), a ROTEM may be ordered at any time for evaluation of hemostasis. It is recommended to order a ROTEM after the MTP is completed.
    a. ROTEM trauma panel will include EXTEM and TIBTEM

B. 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
            1. Stick must be with a 23 gauge needle or larger
                a. Waste at least 2 ml of blood
            2. Draw from line with no heparin
                a. Waste at least 2 ml of blood
    b. Specimen must be hand delivered to lab
        i. Cannot use tube system

C. 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

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.
- 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.0b013e3181faaa25
- 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:

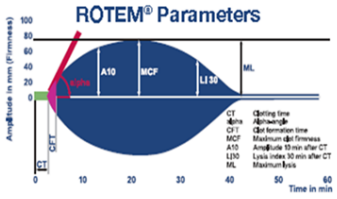
ROTEM® CHECKPOINT

What's the Temogram Shape?

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

Evaluate

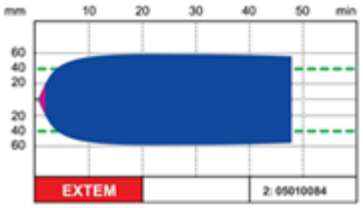
- **ML** – Clot Stability / Lysis (consider TXA)
- **A10** – Amplitude for Clot Strength (consider Plts & Fibrinogen)
- **CT** – Thrombin Generation (consider FFP, PCCs Protamine)



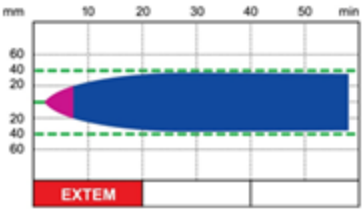
Assay Panels

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

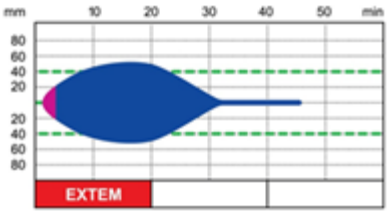
Overview of Temogram Shapes:



Firm & Stable
(Wine Glass Shape)



Relatively Weak
(Bullet Shape)



Unstable
(Fish Shape)

Normal Factors:

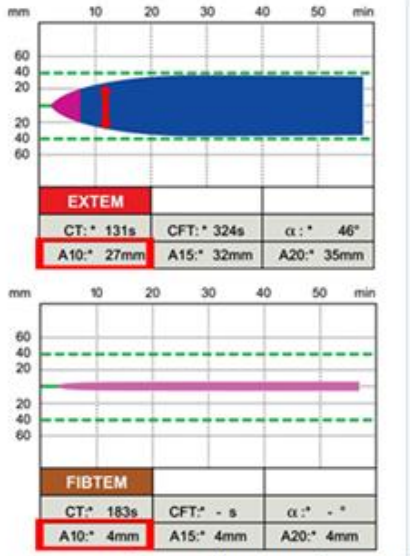
Factors	EXTEM	FIBTEM
CT	43 – 82 seconds	
A10	40 – 60 seconds	7 – 10 mm
A20	50 – 70 seconds	7 – 24 mm
ML	15% or less	

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)

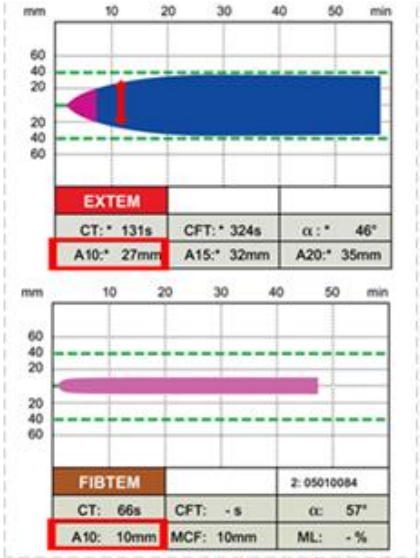
Observe the ROTEM TEMOGRAM:

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

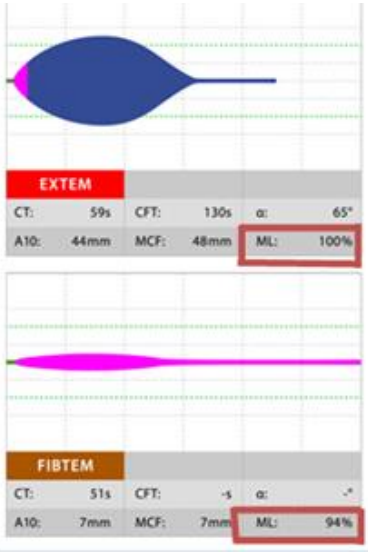
Three Examples:



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

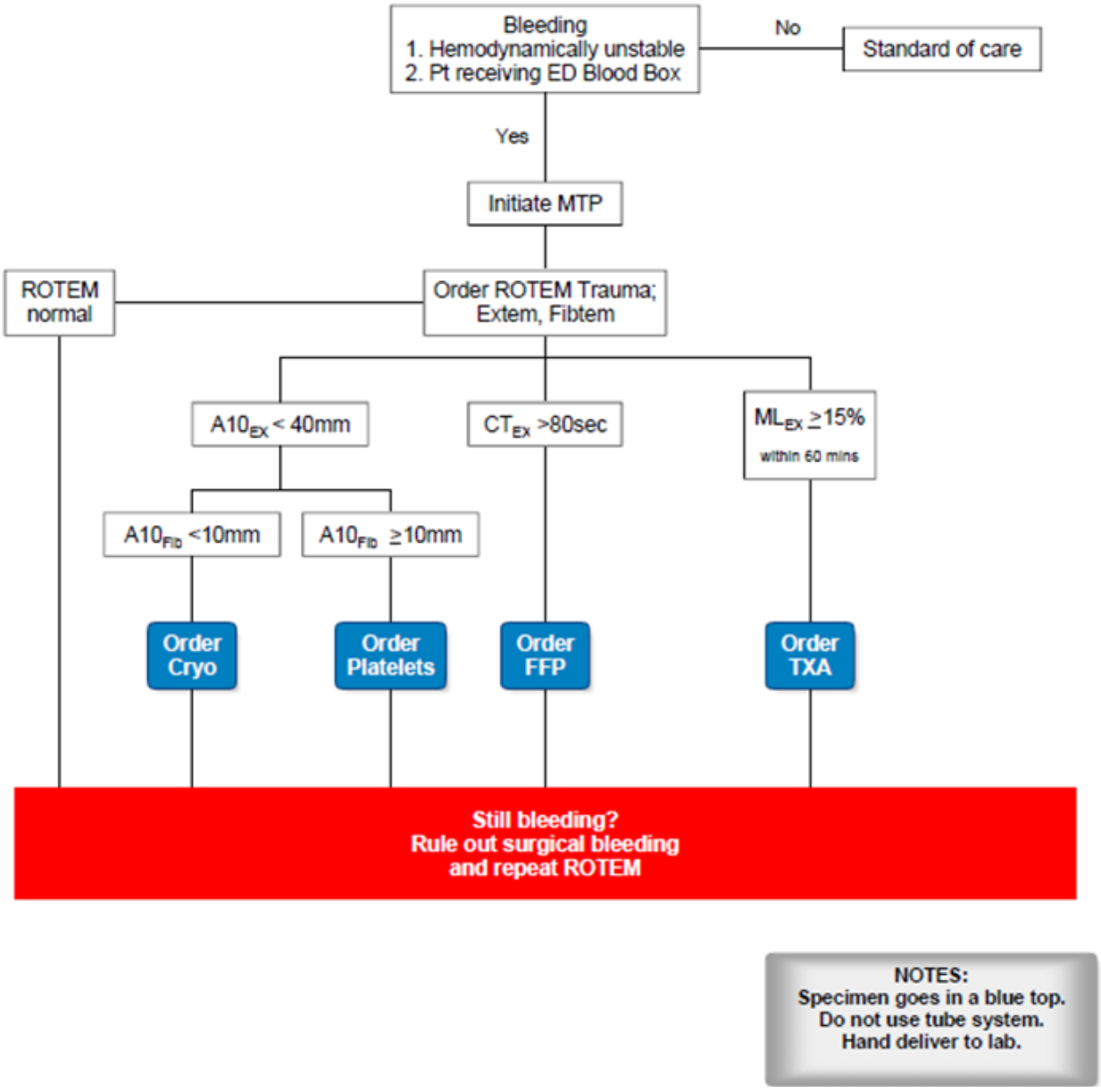


Suggests adequate fibrin contribution to clot firmness. Pt needs platelets.



Suggests hyperfibrinolysis. Pt needs TXA.

ROTEM Algorithm



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