Correlation between activated clotting time (ACT) and activated partial thromboplastin time (APTT) in interventional neuroradiology

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Learning Objectives

To evaluate the correlation between the activated clotting time (ACT) and activated partial thromboplastin time (APTT) during endovascular coil embolization (ECE) of cerebral aneurysms in order to improve the unfractionated heparin (UFH) management

Background

Heparinization is basically monitored in ECE patients to minimize the thromboembolic and hemorrhagic complications and to decrease the delayed subarachnoid haemorrhage induced neurological deficits. Currently, APTT and ACT are utilized to monitor the level of anticoagulation with UFH; however, no guidelines have yet been formulated and implemented regarding the optimal coagulation management during ECE procedures, and few literature comparing ACT and APTT results deals with interventional neuroradiology patients.

Imaging Findings OR Procedure Details

The APTT, a measure of the anti-IIa activity of heparin, is the primary laboratory test used to monitor the level of anticoagulation with UFH, which lacks the real-time monitoring (turnaround time of 60-90 min) and is a highly variable test with inconsistent results due to numerous factors such as the type of reagents used, hematocrit, temperature, pH, activating agent, and lack of standardized measurement methods.

The ACT is utilised for bedside monitoring of UFH in situations requiring high-dose heparin therapy including interventional neuroradiology (ECE procedures), dialysis, interventional cardiology (cardiac catheterization and angiography, intra-aortic balloon pumping), extracorporeal membrane oxygenation, and operative procedures such as vascular surgery, valve replacements, and carotid endarterectomy. However, the variability between different analysers, the lack of a linear relationship between ACT values and heparin concentration, operator technique, temperature, hemodilution, coagulation abnormalities, platelet interactions, and antifibrinolytic drugs limit the accuracy of the test.

The correlation between the APTT and ACT in patients receiving heparin is poor and ranges from 0.41 to 0.92. This significant variability partially results from differences in study design including patient population, type of instrumentation, and timing of measurements. The heparin concentration measured by heparin antifactor Xa analysis exhibits a stronger correlation with the APTT (ranging from 0.36 to 0.89) than with the ACT.
(ranging from 0.24 to 0.98), hence the ACT could not yield the true level of anticoagulation and UFH monitoring in critically ill patients using the ACT cannot be recommended.

**Conclusion**

Intraoperative ACT is not able to provide comparable thresholds of normal haemostasis as compared to APTT.

**Personal Information**

**References**


