Effect of recent DOAC administration on intravenous heparin monitoring with anti-Xa and aPTT lab assays

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Purpose:

The use of direct oral anticoagulants (DOACs) has an increasing prevalence in chronic anticoagulation therapy. Factor Xa inhibition with these agents can contribute to unreliable monitoring of IV heparin using standard anti-Xa levels. This observational study will assess the clinical response of anti-Xa and aPTT levels in patients with recent use of direct oral anticoagulants. Eligible monitoring assays will be evaluated to guide future clinical management of IV heparin therapy in DOAC patients.

Methods:

This is a single-center, retrospective observational study conducted at a 586-bed acute care center. The study population consists of IV heparin-initiated patients with recent use of apixaban, edoxaban, or rivaroxaban. Patients were excluded if they were not titrated based on our standard anti-Xa heparin dosing nomogram. All anti-Xa and aPTT levels collected within 120 hours of DOAC administration were assessed in relation to our standard reference ranges. The percentage of values outside of the corresponding reference ranges, along with time elapsed until therapeutic dose titration, was noted. Subgroup analysis will be conducted in patients with diagnosis of AKI upon admission, BMI $\geq$ 40 kg/m^2, different DOAC agents, and time periods of 0-24, 24-48, 48-72, 72-96, and 96-120 hours post DOAC dose, including mean and median values for each time interval. All data collection excludes patient identifiers, and has been maintained confidentially.

Results:

Therapeutic anti-Xa vs. aPTT levels were achieved in 82.5% vs. 37.5% of patients during their course of IV heparin. In patients that achieved therapeutic lab assays, anti-Xa levels were first therapeutic at an average of 18 hours and 57 minutes elapsed post initiation of IV heparin vs. 39 hours and 40 minutes elapsed post IV heparin initiation for aPTT lab assays. Of all anti-Xa lab assays collected within 120 hours post-DOAC, 46.1% were therapeutic, 40.3% were supratherapeutic and 13.6% were subtherapeutic. aPTT values within the same timeframe were 10.6% therapeutic, 14.1% supratherapeutic, and 75.4% subtherapeutic. Mean and median values for anti-Xa assays decreased significantly per time interval post-DOAC dosing. There was no significant correlation between aPTT assays and time since DOAC administration.

Conclusions:

Recent DOAC administration leads to significant elevation in anti-Xa values compared to aPTT values per time since last dose of administration. The majority of IV heparin patients with recent DOAC administration never achieved therapeutic aPTT lab assays. Furthermore, per study findings, there was no significant trend toward therapeutic aPTT levels within 96 hours of DOAC dosing. Based on the consistently subtherapeutic aPTTs within 120 hours post-DOAC dosing, this patient population may be at higher risk for recurrent thrombosis when dosed by utilizing the anti-Xa nomogram alone. Thus, due to prolonged effect on anti-Xa assays, there is an apparent need for alternative intravenous heparin monitoring strategies in patients with documented recent dosing of apixaban or rivaroxaban.