Anticoagulated Trauma Patient

Anticoagulants should be reversed immediately if TBI or significant bleeding is even POSSIBLE.

The frequent use of anticoagulants in the elderly puts them at higher risk for significant bleeding events, even in the context of minor injury. Warfarin and novel oral anticoagulants (NOACs) have been shown to increase the severity of head injury and increase mortality rate. Mortality of trauma patients with head injury while on warfarin ranges from 33% to 50%. Furthermore, it has been reported that the head injured patients on warfarin have an increased risk of mortality from 2-fold to 4-fold, when compared with non-anti-coagulated patients with similar degrees of head injury.

As part of the trauma workup, one should always obtain an adequate history, which includes a list of current home medications. Early identification of warfarin use has been shown to reduce mortality on patients with intracranial hemorrhage from 48% to 9%.

Another important aspect of the anti-coagulated patient is the decreased reliability of their neurological exam. It has been shown that GCS of 15 and no loss of consciousness does not reliably rule out intracranial pathology after trauma. Therefore, all patients with known warfarin or NOAC use should have a CT scan of the head as part of their trauma workup regardless of their mental status.

If ICH is known or strongly suspected OR significant bleeding is suspected at any site, use reversal guideline incorporating aPCCs' to achieve rapid effect. If active bleeding is not suspected based upon exam, mechanism is not significant AND neuro exam is satisfactory, reversal of warfarin may be initiated by administration of FFP (15-30cc/kg). In all patients receiving reversal therapy for warfarin, vitamin K is indicated. Repeat head CT is indicated at some point prior to discharge in all patients using systemic anticoagulants on admission.
The following labs should be drawn STAT and repeated as clinically indicated. While these labs may help to identify the presence or absence of oral anticoagulants the results of these studies should not delay the anticoagulation reversal treatment if a history of oral anticoagulant use is present or known.

1. CBC
2. PT/INR
3. BMP
4. aPTT
5. consider TEG or ROTEM

In patients taking anticoagulants on admission for afib and/or prior DVT/PE, consider having patient remain off of therapeutic anticoagulation until at least 2 weeks after injury, to be determined on follow-up with PCP or SGB using input from Neurosurgery.

In patients on anticoagulants for cardiac valvular disease, stroke or life threatening thrombotic/thromboembolic disease, consider consulting PCP or cardiologist to determine optimal timing and dose of anticoagulation, with input from Neurosurgery.

If therapeutic anticoagulants are restarted [including warfarin, therapeutic LMWH and novel oral anticoagulants such as the direct thrombin inhibitor (Pradaxa) and factor Xa inhibitors], patients should undergo repeat head CT immediately prior to starting and should be monitored in the hospital for 48-72 hours after anticoagulants are therapeutic.

Lavoie A, Ratte S, Clas D, Demers J, Moore L, Martin M, Bergeron E. Preinjury warfarin use among elderly patients with closed head injuries in a trauma center. J Trauma. 2004 Apr;56(4):802-7.
Mina AA, Bair HA, Howells GA, Bendick PJ. Complications of preinjury warfarin use in the trauma patient. Trauma. 2003 May;54(5):842-7.
Janczyk et al. Rapid warfarin reversal in anticoagulated trauma patients with intracranial hemorrhage reduces

hemorrhage progression and mortality. Abstract presented at AAST annual meeting, September 30, 2004.
Alahmadi H, et al. The Natural History of Brain Contusion: An Analysis of Radiological and Clinical Progression. J Neurosurgery. 2010;112:1139-1145.
Itshayek E et al. Delayed Posttraumatic Acute Subdural Hematoma in Elderly Patients on Anticoagulation. Neurosurgery. 2006;58:851-855

Indication	Drug	Dose	Max Dose
Known Drug Exposure			
Direct Thrombin Inhibitors Dabigatran (Pradaxa)	Praxbind	5 grams	5 grams
Bivalirudin Argatroban	FEIBA (aPCC)	12.5 – 25 units/kg	100 units/kg
Factor Xa Inhibitors Apixaban(Eliquis) Rivaroxaban (Xarelto) Edoxaban (Savaysa) Fondaparinux (Arixtra)	Kcentra (4PCC)	25-50 units/kg	5000 units
Vitamin K Antagonist Warfarin (Coumadin)	Kcentra (4PCC)*	INR 2 – 4: Dose 25 units/kg INR 4 – 6: Dose 35 units/kg INR > 6: Dose 50 units/kg	INR 2 – 4: Dose 2500 units INR 4 – 6: Dose 3500 units INR > 6: Dose 5000 units
Anticoagulant Exposure Suspected			
Specific Agent Unknown	FEIBA (aPCC)	12.5 – 25 units/kg	100 units/kg
No Anticoagulant Exposure Suspected			
No Drug Contribution	rFVIIa	30 mcg/kg	90 mcg/kg

* Assuming vitamin K 10 mg IV has already been administered
KCentra: Administer at 0.12 mL/kg/min (~3 units/kg/min), max rate of 8.4 mL/min (~210 units/min)
FEIBA: Infusion rate must not exceed 2 unit/kg/min (range of 2.5-7.5ml/min)
Obtain INR 30 minutes after administration complete when reversing warfarin

Agent Review and Coagulation Evaluation

Drug	MoA	Half-Life	PT/INR	aPTT
Dabigatran (Pradaxa)	Direct Thrombin Inhibitor	12 – 14 hours (Prolonged in renal dysfunction and elderly)	Not elevated at therapeutic levels, moderately elevated at supra-therapeutic levels	Elevation indicative of presence but not degree of anticoagulation
Rivaroxaban (Xarelto)	Factor Xa Inhibitor	5 – 9 hours (Prolonged in renal dysfunction and elderly)	Elevated levels consistent with ingestion at higher doses	No significant effect
Apixaban (Eliquis)	Factor Xa Inhibitor	8 – 15 hours (Prolonged in renal dysfunction and elderly)	Elevated levels consistent with ingestion at higher doses	No significant effect
Edoxaban (Savaysa)	Factor Xa inhibitor	10-14 hours (Prolonged in renal dysfunction and elderly)	Elevated levels consistent with ingestion at higher doses	No significant effect
Warfarin (Coumadin)	Vitamin K Antagonist	INR Reversal 6 – 24 hrs w/ vit K 2 – 8 hrs w/ FFP Minutes w/ FEIBA	Elevation in relation to dose	No significant effect

Reversal for aspirin and anti-platelet use: Consider Platelets per hospital policy.