Periprocedural Management of Coagulopathy, Thrombocytopenia, and Antithrombotic Agents

Jessica A. Blank and André M. Mansoor, M.D.
Oregon Health & Science University

	Paracentesis and Thoracentesis	Lumbar Puncture		Arthrocentesis
		Withhold prior to LP	First dose after LP	
INR*	• <1.5[4,5] • <2-3[6] • Any INR [6]	• <1.4[3] • 1.2-1.5[7]		• <1.5[4] • 2-3[10,11]
Platelets	• >50[5] • >20[6]	• > 50[6] • >40[1,13] • If 20-40, have a risk: benefit discussion (can consider transfusion if urgent)[1,2]		No current data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
ASA	Continue[5,6]	• Continue[1,3] • Hold 3-5 days[6]	No delay[1]	Continue[12]
Clopidogrel	Continue [5,6]	• Hold 5-7 days (consider ASA cover)[1,3,6] • If high thrombotic risk, can hold closer to 5 days.[3]	Start after 6 hours[1]	Continue [12]
Prasugrel	Continue [5,6]	• Hold 7 days[1,6] • Hold 5-10 days[3]	Start after 6 hours[1]	Continue [12]
Ticagrelor	Continue [5,6]	• Hold 7 days[1] • Hold 5 days[3,6]	Start after 6 hours[1]	Continue [12]
Abciximab	Hold 24 hours[6]	• Hold 48 hours[1,3] • Hold 24 hours[6]	Start after 24 hours[1]	No data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
Tirofiban Eptifabatide	Hold 4-8 hours [6]	• Hold 4-8 hours[1,6] • Hold 24 hours[3]	Start after 24 hours[1]	No data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
Dipyridamole	Continue (even if used concurrently with aspirin) [6]	• Hold 24 hours[1] • Continue if being used w/o aspirin[3] • Hold 3-5 days if being used with aspirin[6]	Start after 6 hours[1]	No data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
Warfarin	Hold 5 days (consider bridging)[4,5] with a target INR <1.5[4] - <3[6]	• Hold 5 days (consider bridging) [1,3,6,7] • If urgent, use reversal agent: Vitamin K	Start after 12 hours[1]	• Hold 5 days (consider bridging)[4] • Continue[9]

				• Continue if INR therapeutic 2-3[10,11]
LMWH	Continue [6]	• Prophylactic: Hold 12 hours[1,3] or hold one dose[6] • Therapeutic: Hold 24 hours[1,3] or hold two doses[6]	• Prophylactic: Start after 4 hours[1] • Therapeutic: Start after 4 hours, if traumatic, start after 24 hours[1]	No data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
Unfractionated Heparin Infusion	Continue [6]	• Hold 4-6 hours[1,3,6,7]	Start after 1 hour[1]	No data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
Fondaparinux	Continue [6]	• Prophylactic: Hold 12 hours[1] • Therapeutic: Hold 4 days[3], hold 2-3 days (CrCl >50)[6] or 3-5 days (CrCl<50)[6]	Start after 6-12 hours[1]	No data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
Agatroban	Continue [6]	Hold 2-4 hours[6]	No data	No data. Defined as a low-bleeding risk procedure, similar to a Para/Thora. Consider using Para/Thora recommendations.
Dabigatran	• Hold 24-48 hours[4,5] (with CrCl<50, hold 72hours[5]) • Continue[6]	• Hold 48 hours[1] • Hold 4 days (5-6 if impaired renal function)[3] • Withhold 4 doses (CrCl ≥50 mL/min) or 6–8 doses (CrCl <30–50 mL/min) [6] • If urgent, use reversal agent: idarucizumab[6]	Start after 6 hours[1]	• Hold 1-2 days[4] • Continue[8,9]
Rivaroxaban	• Hold 24-48 hours[4,5] • Continue[6]	• Hold 24 hours [1] • Hold 3 days [3] • Withhold 2 doses (CrCl ≥ 30 mL/min) or 3 doses (CrCl < 30 mL/min) [6] • If urgent, use reversal agent: andexanet alfa [6:]	Start after 6 hours[1]	• Hold 1-2 days [4] • Continue [8,9]
Apixaban	• Hold 24-48 hours[4,5] • Continue[6]	• Hold 24 hours [1] • Hold 3 days [3] • Withhold 4 doses (CrCl ≥ 50 mL/min) or 6 doses (CrCl <30–50 mL/min) [6] • If urgent, use reversal agent: andexanet alfa [6]	Start after 6 hours[1]	• Hold 1-2 days [4] • Continue [8,9]

*INR goals are in reference to patients without chronic liver disease. Elevated INR in the setting of chronic liver disease is not a reliable indicator of bleeding risk.

General Concepts

Bleeding Risk based on procedure:

- Normal/Low Risk of Bleeding: Paracentesis, Thoracentesis, Arthrocentesis[2]
- High Risk of Bleeding: Lumbar Puncture[2]

When in doubt, use the below guidelines when deciding how to hold anticoagulation:

- Normal/Low Risk of Bleeding: aim for 2-3 drug half-lives between last dose and procedure [2]
- High Risk of Bleeding: aim for 4-5 drug half-lives between last dose and procedure [2]

Risk: Benefit Discussion:

A risk-benefit conversation should be held with the primary team, procedure team, and patient when stopping anticoagulation for a procedure. If the procedure is time-sensitive or urgent (e.g., an LP for meningitis/SAH, paracentesis for SBP, etc.) then you can consider reversing the anticoagulation or balance the risks with the necessity of the procedure. Another option is using a smaller needle (such as a 22G) to draw off a smaller diagnostic sample rather than performing the whole procedure with the larger catheter. This would be applicable for urgent situations such as SBP where a diagnostic sample should be drawn early and, ideally, before starting antibiotics. This is less applicable for lumbar punctures as the needles are already small and still must go into a closed space where the result of increased bleeding could be devastating.

The thrombotic risk of the patient should be considered as well.[2]

- Examples of high thrombotic risk patients (requires bridging for Warfarin): mitral valve prosthesis, caged-ball/tilting disc aortic valve prosthesis, stroke/TIA within last 6 months, CHA_2DS_2-VASc score ≥ 5, Rheumatic valvular heart disease, VTE within last 3 months, any history of VTE with severe thrombophilia) e.g., protein C, protein S, or antithrombin deficiency, antiphospholipid antibodies, homozygous factor V Leiden, prothrombin G20210A)
- Examples of low thrombotic risk patients: bileaflet aortic valve prosthesis, CHA_2DS_2-VASc score < 5, VTE within last 3-12 months, VTE with non-severe thrombophilia (e.g., heterozygous factor V Leiden, prothrombin gene mutation), recurrent idiopathic VTE, active cancer (treated within 6 months or palliative), VTE within last 12 months with no other risk factors

Renal Impairment:

Impaired renal function should be considered when determining appropriate hold times for anticoagulants.

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