THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Antiplatelet and Anticoagulant Therapy Management Surrounding Regional Anesthesia

Key Points:

- Neuraxial complications are extremely rare. Epidural hematomas are one possible complication of neuraxial anesthesia. [1]
- Antiplatelet or anticoagulant medications may increase the incidence of a neuraxial bleed.[2]
- Contact the Department of Anesthesiology Acute Pain Team with questions about resuming antiplatelet or anticoagulant medications in relation to neuraxial anesthesia.
- These recommendations do not apply to patients with perineural catheter placement.

Table 1:

Antiplatelet Agents				
Medication	**Dose**	**Prior to Procedure** *Minimum recommended time between last dose of antithrombotic agent and neuraxial catheter placement or neuraxial procedure*	**While Catheter in Place** *Restrictions while neuraxial catheter in place*	**Post Procedure** *Minimum recommended time between neuraxial catheter removal or neuraxial procedure and next dose of antithrombotic agent*
Aspirin* [3]	Refer to OSUWMC Clinical Practice Guideline: Management of Antiplatelet Therapy in Patients with Arterial Stents Around the Time of Surgeries and Procedures			
Aspirin/ Dipyridamole* (Aggrenox®) [3]	Patient- and procedure-specific decision should be made with patient and care team.			
	All doses	7 days*		24 hours
Clopidogrel* (Plavix®) [3]	Refer to OSUWMC Clinical Practice Guideline: Management of Antiplatelet Therapy in Patients with Arterial Stents Around the Time of Surgeries and Procedures			
	75mg daily	7 days	Avoid while catheter is in place	12 hours; 24 hours if administering a loading dose
Dipyridamole (Persantine®)[5]	All doses	48 hours*		24 hours
Prasugrel * (Effient®)[3]	Refer to OSUWMC Clinical Practice Guideline: Management of Antiplatelet Therapy in Patients with Arterial Stents Around the Time of Surgeries and Procedures			
	All doses	10 days**	Avoid while catheter is in place	24 hours
Ticagrelor* (Brilinta®)[3]	Refer to OSUWMC Clinical Practice Guideline: Management of Antiplatelet Therapy in Patients with Arterial Stents Around the Time of Surgeries and Procedures			
	All doses	5 days	Avoid while catheter is in place	24 hours
Cilostazol (Pletal®)[4]	All doses	48 hours*		24 hours
Non-Aspirin NSAIDs [5]	Non-Selective	No need to hold dose If decision is made to hold, duration should be based upon 5 half-lives of specific NSAID. Contact Pharmacy for assistance. See Table 2		4 hours
	COX-2 Selective	No need to hold dose		
Voraxapar (Zontivity®)	All doses	Contraindicated	Avoid while catheter is in place	

Medication	Dose	**Prior to Procedure** *Minimum recommended time between last dose of antithrombotic agent and neuraxial catheter placement or neuraxial procedure*	**While Catheter in Place** *Restrictions while neuraxial catheter in place*	**Post Procedure** *Minimum recommended time between neuraxial catheter removal or neuraxial procedure and next dose of antithrombotic agent*
GP IIb/IIIa inhibitors				
Abciximab (Reopro®) [5]	All doses	5 days	Avoid while catheter is in place	12 hours**
Eptifibatide (Integrilin®)[5]		24 hours		
Tirofiban (Aggrastat®)[5]				
Direct Thrombin Inhibitors (Injectable)				
Argatroban	Continuous Infusion	If neuraxial anesthesia is needed, decision should be discussed with Anesthesiologist, surgical team, and pharmacy specialist	Avoid while catheter is in place	24 hours
Bivalirudin (Angiomax®)				
Desirudin (Iprivask®)	All doses	24 hours	Avoid while catheter is in place	
Thrombolytic Agents				
Alteplase (TPA®)[5]	Therapeutic dose for stroke, etc.	Minimum 48 hours for emergency procedures	Not recommended, but maintain catheter if emergency thrombolytic therapy is required and notify Department of Anesthesiology Acute Pain Team.	48 hours or normalization of fibrinogen
Alteplase (TPA®)	1mg – 2mg (catheter clearance)	No need to hold dose		
Injectable Anticoagulants				
Heparin unfractionated [2,5]	5000 units SQ Q12H	Inpatients: No time restriction. Consider the peak effect of subcutaneous heparin at 2 hours when placing catheter. Outpatients: 8 hours	5000 units Q12H may be given while indwelling catheter in place with concurrent SCDs Can be restarted a minimum of 2 hours post-neuraxial anesthesia catheter placement.	2 hours- Consider PTT if concern for bleeding risk
	5000 units SQ Q8H	8 hours	ASRA guidelines prefer the use of Q12H dosing, however risk of bleed vs clot must be considered when using TID dosing	
	7500 units SQ Q8H	8 hours	Avoid while catheter is in place	
	IV Infusion	4 hours if normal PTT	Avoid while catheter is in place	

M**edication**	**Dose**	**Prior to Procedure** *Minimum recommended time between last dose of antithrombotic agent and neuraxial catheter placement or neuraxial procedure*	**While Catheter in Place** *Restrictions while neuraxial catheter in place*	**Post Procedure** *Minimum recommended time between neuraxial catheter removal or neuraxial procedure and next dose of antithrombotic agent*
Dalteparin (Fragmin®)[6]	5000 units SQ QDay	CrCl > 30mL/min: 12 hours CrCl ≤ 30mL/min: 24 hours (consider anti-Xa level to assess level of anticoagulation)***	Must wait 8 hours post-catheter placement to re-initiate dosing	24 hours **
	200 units/kg SQ QDay 100 units/kg SQ Q12H	CrCl > 30mL/min: 24 hours CrCl ≤ 30 mL/min: 48 hours (consider anti-Xa level to assess level of anticoagulation)***	Avoid while catheter is in place	24 hours
Enoxaparin (Lovenox®)[5,7,8]	40mg SQ QDay	CrCl > 30 mL/min: 12 hours CrCl ≤ 30mL/min: 72 hours (consider anti-Xa level to assess level of anticoagulation)***	Must wait 12 hours post-catheter placement to re-initiate dosing	4 hours**
	30mg SQ Q12H 40mg SQ Q12H		Avoid while catheter is in place	
	1mg/kg Q12H 1 – 1.5mg/kg SQ QDay	CrCl > 30 mL/min: 24 hours CrCl ≤ 30 mL/min: 72 hours (consider anti-Xa level to assess level of anticoagulation)***		24 hours
Fondaparinux (Arixtra®) [5]	2.5mg SQ QDay	CrCl > 50 mL/min: 3 – 4 days CrCl ≤ 50 mL/min: 4 days (consider anti-Xa level to assess level of anticoagulation)***	Avoid while catheter is in place	24 hours
	5 – 10mg SQ QDay	CrCl > 50 mL/min: 4 days CrCl ≤ 50 mL/min: 5 days (consider anti-Xa level to assess level of anticoagulation)***		24 hours

Oral Anticoagulants				
Medication	**Dose**	**Prior to Procedure** *Minimum recommended time between last dose of antithrombotic agent and neuraxial catheter placement or neuraxial procedure*	**While Catheter in Place** *Restrictions while neuraxial catheter in place*	**Post Procedure** *Minimum recommended time between neuraxial catheter removal or neuraxial procedure and next dose of antithrombotic agent*
Apixaban (Eliquis®)[5]	All doses	CrCl > 30 mL/min: 3 days CrCl ≤ 30mL/min: 5 days	Avoid while catheter is in place	24 hours
Dabigatran (Pradaxa®)[5]	All doses	CrCl > 15 mL/min: 5 days CrCl ≤ 15mL/min: 6 days		24 hours
Edoxaban (Savaysa®)[5]	All doses	CrCl > 50mL/min: 3 days CrCl ≤ 50mL/min: 5 days		24 hours
Rivaroxaban (Xarelto®)[5]	All doses	CrCl > 50mL/min: 3 days CrCl ≤ 50mL/min: 5 days		24 hours
Warfarin (Jantoven®, Coumadin®)[5]	All doses	5 days, normalization of INR		24 hours
Hemorrheologic Agents				
Pentoxifylline (Trental®)		No need to hold dose		
Herbal Agents				
Herbal Agents Including (but not limited to): Aloe, burdock root, chamomile, chondroitin, dong quai, evening primrose, flaxseed, fish oil, garlic, ginger, gingko, ginseng, glucosamine, green tea, hu zhang, saw palmetto, turmeric, vitamin a and e		7 days	Avoid while catheter is in place	Preferred hold time 24 hours. Contact Pharmacy Specialist for recommendation for specific medication recommendation.

*Patient- and procedure-specific decision should be made with patient and care team whether to hold medication.
** For medications wherein ASRA guidelines recommend a range of holding, we have elected to recommend the more conservative holding time due to renal elimination of medications and lack of reversal agents.
*** Order anti-Xa level specific to Low Molecular Weight Heparins (anti-Xa LMW Heparin). For other agents that effect Factor Xa, the presence of an elevated Xa indicates presence of the medication and does not necessarily reflect the degree of anticoagulation.

Table 2: Half-Lives of Commonly Administered Non-Aspirin NSAIDs[5, 9-18]

NSAID	Half- life, h	Discontinuation Time, 5 Half-lives, h
Diclofenac	1-2	5-10
Etodolac	6-8	30-40
Ibuprofen	2-4	10-20
Indomethacin	5-10	25-50
Ketorolac	5-6	25-30
Meloxicam	15-20	75-100
Nabumetone	22-30	110-150
Naproxen	12-17	60-85
Oxaprozin	40-60	200-240
Piroxicam	45-50	225-250

OSUWMC Resources

- OSUWMC Preoperative Testing and Medication Management

References

1. Neal JM, Barringer MJ, et al. The Second ASRA Practice Advisory on Neurologic Complications Associated With Regional 2015 Sep-Oct; 40: 401-30.
2. Horlocker TT, Wedel DJ, Rowlingson JC, et al. Regional anesthesia in the patient receiving antithrombotic therapy or thrombolytic therapy: American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines (Third Edition). Reg Anesth Pain Med 2010; 35: 64–101.
3. OSUWMC Clinical Practice Guideline. Management of Antiplatelet Therapy in Patients with Arterial Stents Around the Time of Surgeries and Procedures. 2014.
4. Pletal® (cilostazol) [package insert]. Otsuka America Pharmaceutical, Inc., Rockville, Maryland, USA, 1999.
5. Narouze S, Benzon HT, Provenzano DA, et al. Interventional Spine and Pain Procedures in Patients on Antiplatelet and Anticoagulant Medications: Guidelines From the American Society of Regional Anesthesia and Pain Medicine, the European Society of Regional Anaesthesia and Pain Therapy, the American Academy of Pain Medicine, the International Neuromodulation Society, the North American Neuromodulation Society, and the World Institute of Pain. Reg Anesth Pain Med 2015; 40: 182–212.
6. Fragmin® (dalteparin sodium) [package insert]. Eisai, Inc, Woodcliff Lake, NJ, 2007.
7. Lovenox® (enoxaparin sodium) [package insert]. Sanofi-Aventis U.S. LLC (per FDA), Bridgewater, NJ, 2013.
8. Brophy DF, Wazny LD, & Gehr TWB: The pharmacokinetics of subcutaneous enoxaparin in end-stage renal disease. Pharmacotherapy 2001; 21: 169-174.
9. Small RE. Diclofenac sodium. Clin Pharm. 1989; 8: 545–558.
10. Brocks DR, Jamali F. Etodolac clinical pharmacokinetics. Clin Pharmacokinetic 1994; 26: 259–274.
11. Rainsford KD. Ibuprofen: pharmacology, efficacy and safety. Inflammopharmacology 2009; 17: 275–342.
12. Helleberg L. Clinical pharmacokinetics of indomethacin. Clin Pharmacokinetic. 1981; 6: 245–258.
13. Mroszczak EJ, Jung D, Yee J, Bynum L, Sevelius H, Massey I. Ketorolac tromethamine pharmacokinetics and metabolism after intravenous, intramuscular, and oral administration in humans and animals. Pharmacotherapy. 1990; 10: 33S–39S.
14. Turck D, Roth W, Busch U. A review of the clinical pharmacokinetics of meloxicam. Br J Rheumatol 1996; 35 (suppl 1): 13–16.
15. Dahl SL. Nabumetone: a “nonacidic” nonsteroidal anti-inflammatory drug. Ann Pharmacother 1993; 27: 456–463.
16. Davies NM, Anderson KE. Clinical pharmacokinetics of naproxen. Clin Pharmacokinet 1997; 32: 268–293.
17. Miller LG. Oxaprozin: a once-daily nonsteroidal anti-inflammatory drug. Clin Pharm 1992; 11: 591–603.
18. Olkkola KT, Brunetto AV, Mattila MJ. Pharmacokinetics of oxicam nonsteroidal anti-inflammatory agents. Clin Pharmacokinet 1994; 26: 107–120.

Guideline Authors

- Richard Bryant, MD
- Matthew McKiernan, MD
- Kristin Brower, PharmD, BCPS
- Danielle Blais, PharmD, BCPS
- J Michael Boyd, PharmD, BCPS
- Sarah Dickey, PharmD, BCPS

Guideline Approval

February 28, 2018. First Edition

Disclaimer: *Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC's guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.*

Copyright © 2018. The Ohio State University Wexner Medical Center. All rights reserved. No part of this document may be reproduced, displayed, modified, or distributed in any form without the express written permission of The Ohio State University Wexner Medical Center.