

Bon Secours Richmond
Pharmacy & Therapeutics Committees
Safety of Anticoagulation in Neuraxial Blockade
11/2005

Recommendations:

- The following medications must receive approval of the anesthesiologist prior to administration in patients with epidural catheters:
 - Low molecular weight heparins, including, [Lovenox (enoxaparin), Fragmin (Dalteparin)]
 - Factor Xa inhibitors: Arixtra (fondaparinux)
 - Direct thrombin Inhibitors: Angiomax (bivalirudin), argatroban, Refludan (lepirudin)
 - 2b/3a platelet inhibitors: Integrilin (eptifibatide), ReoPro (abciximab), Aggrastat (tirofiban)
 - Full dose or continuous infusion heparin (not low dose heparin, 5000 units SC q12h)
 - Platelet inhibitors: Ticlid (Ticlopidine), Plavix (Clopidogrel)
 - IV Thrombolytics (not catheter clearance protocols), Activase (alteplase), TNK (tenecteplase), streptokinase
- Warfarin per orthopedic surgery protocol may be administered; anesthesia must approve all other orders for warfarin in patients with neuraxial catheters.
- Pharmacy will enter the pharmacy computer system that will print on the MAR for all patients with epidural catheters: Do not administer the following medications without approval of anesthesia to patients with epidural catheters: Lovenox (enoxaparin), Fragmin (dalteparin), Arixtra (fondaparinux), Angiomax (bivalirudin), argatroban, Refludan (lepirudin), Integrilin (eptifibatide), ReoPro (abciximab), Aggrastat (tirofiban), therapeutic dose heparin, Ticlid (ticlopidine), Plavix (clopidogrel), Activase (alteplase), TNK (tenecteplase), streptokinase or other anticoagulants unless approved by the anesthesiologist on call. Minidose subcutaneous heparin (5000 units Q12 hours), Celebrex, and NSAID may be administered. The SMS note is EPID.
- A pyxis message will display for the above medications warning nursing not to administer the medications to patients with epidural catheters.
- An informational sheet for the physician will be placed in the orders section of the chart for all patients with epidural catheters.
- A specific order for patients receiving warfarin or low molecular weight heparins should be written to state when the epidural catheter is to be removed.
 - Example: A sticker "CAUTION Epidural Hematoma Risk, Epidural to be removed on _____ date _____ hours after the last dose of _____ and _____ hours prior to the next dose of _____."

Specific Recommendations from The American Society of Regional Anesthesia and Pain Medicine Consensus Conference on Neuraxial Anesthesia and Anticoagulation include:

- Preoperative Warfarin
 - Chronic warfarin therapy should be stopped 4-5 days prior to neuraxial anesthesia.
 - Normal range INR values are associated with normal hemostasis when discontinuing chronic warfarin therapy.
 - INR should be measured prior to initiation of neuraxial block
- Postoperative Warfarin
 - The analgesic solution used for neuraxial block should be tailored to minimize the degree of sensory and motor block.
 - INRs ≤ 1.5 are associated with normal hemostasis on initial of warfarin
 - INR should be ≤ 1.5 when the epidural catheter is pulled
 - Warfarin should be withheld or reduced in patients with indwelling neuraxial catheters when the INR is > 3 .

- Preoperative LMWH
 - Needle placement should be no sooner than
 - 24 hours after therapeutic doses of Lovenox (DVT/PE treatment)
 - 10-12 hours after prophylaxis with single daily dose of LMWH
- Postoperative LMWH
 - Lovenox should be given no sooner than 2 hours after catheter removal and should be delayed 24 hours postoperatively if blood is present during needle or catheter placement.
 - LMWH (twice daily dosing prophylaxis regimens,)
 - Initiated postoperatively should start no earlier than 24 hours postoperatively
 - If continuous technique used, remove catheter at least 2 hours before 1st dose of LMWH
 - LMWH (Single daily dosing prophylaxis regimens)
 - First dose 6-8 hours postoperatively
 - Second dose of LWMH should be given no sooner than 24 hours after the first dose.
 - Catheter should be removed a minimum of 10-12 hours after the last dose of LMWH
 - Lovenox should be given no sooner than 2 hours after catheter removal and should be delayed 24 hours postoperatively if blood is present during needle or catheter placement.
- Antiplatelet Medications
 - Plavix (Clopidogrel) should be discontinued 7 days prior to neuraxial blockage.
 - Ticlid (Ticlopidine) should be discontinued 10-14 days prior neuraxial blockage.
- 2b/3a Inhibitors:
 - 2b/3a inhibitors (Integrilin, Aggrastat) should be discontinued 8 hours prior to neuraxial blockage
 - Reopro (abciximab) should be discontinued 24-48 hours prior to neuraxial blockage.
- Heparin
 - Heparin intravenous
 - Start heparin \geq 1 hour after neuraxial technique
 - Remove catheter 2-4 hours after heparin infusion stopped, assess coagulation status prior to neuraxial catheter removal
 - Combining neuraxial techniques with intraoperative anticoagulation with heparin during vascular surgery seems acceptable with the following cautions:
 - Avoid this technique in patients with other coagulopathies
 - Heparin administration should be delayed for 1 hour after needle placement
 - Indwelling neuraxial catheters should be removed 2-4 hours after the last heparin dose and the patients coagulation status is evaluated and re-heparinization should occur 1 hour after catheter removal
 - Monitor the patient postoperatively to provide early detection of motor block and consider use of minimal concentration of local anesthetics to enhance the early detection of a spinal hematoma
 - Cardiopulmonary bypass
 - Full dose heparin should be discontinued 2-4 hours prior to neuraxial catheter remove.
 - Neuraxial blocks should be avoided in patients with known coagulopathy from any cause
 - Surgery should be delayed 24 hours in the event of a traumatic tap
 - Time from instrumentation to systemic heparinization should exceed 60 minutes
 - Epidural catheters should be removed when normal coagulation is restored
 - Subcutaneously Heparin
 - Low dose heparin 5000 units subcutaneously q12 hours may be used. If therapy last longer than 4 days, platelets should be monitored prior to neuraxial block and catheter removal.
- Systemic Thrombolytics
 - Patients receiving fibrinolytic and thrombolytic drugs should be cautioned against receiving spinal or epidural anesthetics except in highly unusual circumstances. Data are not available to

clearly outline the length of time neuraxial puncture should be avoided after discontinuation of these drugs.

Findings:

- Since 1993, there have been over 80 reports of epidural or spinal hematoma formation with concurrent use of Lovenox and spinal/epidural anesthesia or spinal puncture.
- As of 1998, there had been 11 published and 2 unpublished case reports of spinal hematoma in foreign patients undergoing spinal or epidural anesthesia while receiving LMWH thromboprophylaxis.
- 12/97 the FDA placed a black-box warning on their label regarding the complication.
- Spinal hematoma rates have been estimated 1:150,000 epidural and less than 1:220,000 spinal anesthetics
- INRs ≤ 1.5 are associated with normal hemostasis on initial of warfarin. Much lower INR values are associated with normal hemostasis when discontinuing chronic warfarin.
- Chronic warfarin therapy should be stopped 4-5 days prior to neuraxial anesthesia.
- NSAIDs: platelet function is affected for the life of the platelet following ASA; other NSAIDs produce a short-term effect, which normalizes within 3 days. Celecoxib does not cause platelet dysfunction.
- Antiplatelet effects of ticlopidine and clopidogrel include inhibition of adenosine diphosphate (ADP)-induced platelet aggregation and platelet-fibrinogen binding.
- Clopidogrel should be discontinued 7 days and ticlopidine 10-14 days, prior to surgery.
- Definitions:
 - Epidural: Anesthesia produced by the injection of a local anesthetic into the epidural space of the lumbar or sacral region of the spine, inducing regional anesthesia from the abdomen or pelvis downward and used especially to control pain during childbirth.
 - Spinal: Anesthesia that involves the injection of an anesthetic into the subarachnoid space of the lumbar region of the spine to produce anesthesia in all body regions that are supplied by nerves that arise below the anatomic region of the block.
 - Spinal hematoma: symptomatic bleeding within the spinal neuraxis is rare potentially catastrophic complication of spinal or epidural anesthesia.
- Factors associated with spinal hematoma
 - Female gender
 - Increased age
 - Anesthetic factors
 - Traumatic needle/catheter placement
 - Epidural (compared to spinal) technique
 - Indwelling epidural catheter during LMWH administration
 - LMWH dosing factors
 - Immediate preoperative (or intraoperative) LMWH administration
 - Early postoperative LMWH administration
 - Concomitant antiplatelet or anticoagulant medication
 - Twice daily LMWH administration
- NSAIDs: platelet function is affected for the life of the platelet following ASA; other NSAIDs produce a short-term effect, which normalizes within 3 days of stopping the medication. Celecoxib does not cause platelet dysfunction.
- Caution should be used in patients receiving fibrinolytic and thrombolytic drugs. These patients should not receive spinal or epidural anesthetics except in highly unusual circumstances.

Postoperative Neuraxial Anesthesia and Anticoagulation Information For the Physician From the Department of Pharmacy

The American Society of Regional Anesthesia and Pain Medicine Consensus Conference on Neuraxial Anesthesia and Anticoagulation recommends the following:

- Postoperative Warfarin
 - The analgesic solution used for neuraxial block should be tailored to minimize the degree of sensory and motor block.
 - INRs ≤ 1.5 are associated with normal hemostasis on initial of warfarin
 - INR should be ≤ 1.5 when the epidural catheter is pulled
 - Warfarin should be withheld or reduced in patients with indwelling neuraxial catheters when the INR is > 3 .
- Postoperative LMWH
 - Lovenox should be given no sooner than 2 hours after catheter removal and should be delayed 24 hours postoperatively if blood is present during needle or catheter placement.
 - LMWH (twice daily dosing prophylaxis regimens)
 - Initiated postoperatively should start no earlier than 24 hours postoperatively
 - If continuous technique used, remove catheter at least 2 hours before 1st dose of LMWH
 - LMWH (Single daily dosing prophylaxis regimens)
 - First dose 6-8 hours postoperatively
 - Second dose of LMWH should be given no sooner than 24 hours after the first dose.
 - Catheter should be removed a minimum of 10-12 hours after the last dose of LMWH
 - Lovenox should be given no sooner than 2 hours after catheter removal and should be delayed 24 hours postoperatively if blood is present during needle or catheter placement.
- Heparin
 - Heparin intravenous
 - Start heparin ≥ 1 hour after neuraxial technique
 - Remove catheter 2-4 hours after heparin infusion stopped, assess coagulation status prior to neuraxial catheter removal
 - Combining neuraxial techniques with intraoperative anticoagulation with heparin during vascular surgery seems acceptable with the following cautions:
 - Avoid this technique in patients with other coagulopathies
 - Heparin administration should be delayed for 1 hour after needle placement
 - Indwelling neuraxial catheters should be removed 2-4 hours after the last heparin dose and the patients coagulation status is evaluated and re-heparinization should occur 1 hour after catheter removal
 - Monitor the patient postoperatively to provide early detection of motor block and consider use of minimal concentration of local anesthetics to enhance the early detection of a spinal hematoma
 - Cardiopulmonary bypass
 - Neuraxial blocks should be avoided in patients with known coagulopathy from any cause
 - Time from instrumentation to systemic heparinization should exceed 60 minutes
 - Surgery should be delayed 24 hours in the event of a traumatic tap
 - Full dose heparin should be discontinued 2-4 hours prior to neuraxial catheter remove.
 - Epidural catheters should be removed when normal coagulation is restored
 - Subcutaneously Heparin
 - Low dose heparin 5000 units subcutaneously q12 hours may be used. If therapy last longer than 4 days, platelets should be monitored prior to neuraxial block and catheter removal.
- Systemic Thrombolytics
 - Patients receiving fibrinolytic and thrombolytic drugs should be cautioned against receiving spinal or epidural anesthetics except in highly unusual circumstances. Data are not available to clearly outline the length of time neuraxial puncture should be avoided after discontinuation of these drugs.

Preoperative Neuraxial Anesthesia and Anticoagulation Information

The American Society of Regional Anesthesia and Pain Medicine Consensus Conference on Neuraxial Anesthesia and Anticoagulation recommends the following:

- Preoperative Warfarin
 - Chronic warfarin therapy should be stopped 4-5 days prior to neuraxial anesthesia.
 - Normal range INR values are associated with normal hemostasis when discontinuing chronic warfarin therapy.
 - INR should be measured prior to initiation of neuraxial block
- Preoperative LMWH
 - Needle placement should be no sooner than
 - 24 hours after therapeutic doses of Lovenox (DVT/PE treatment)
 - 10-12 hours after prophylaxis with single daily dose of LMWH
- Antiplatelet Medications
 - Plavix (Clopidogrel) should be discontinued 7 days prior to neuraxial blockage.
 - Ticlid (Ticlopidine) should be discontinued 10-14 days prior neuraxial blockage.
- 2b/3a Inhibitors:
 - 2b/3a inhibitors (Integrilin, Aggrastat) should be discontinued 8 hours prior to neuraxial blockage
 - Reopro (abciximab) should be discontinued 24-48 hours prior to neuraxial blockage.
- Heparin
 - Heparin intravenous
 - Start heparin \geq 1 hour after neuraxial technique
 - Remove catheter 2-4 hours after heparin infusion stopped, assess coagulation status prior to neuraxial catheter removal
 - Combining neuraxial techniques with intraoperative anticoagulation with heparin during vascular surgery seems acceptable with the following cautions:
 - Avoid this technique in patients with other coagulopathies
 - Heparin administration should be delayed for 1 hour after needle placement
 - Indwelling neuraxial catheters should be removed 2-4 hours after the last heparin dose and the patients coagulation status is evaluated and re-heparinization should occur 1 hour after catheter removal
 - Monitor the patient postoperatively to provide early detection of motor block and consider use of minimal concentration of local anesthetics to enhance the early detection of a spinal hematoma
 - Cardiopulmonary bypass
 - Full dose heparin should be discontinued 2-4 hours prior to neuraxial catheter remove.
 - Neuraxial blocks should be avoided in patients with known coagulopathy from any cause
 - Surgery should be delayed 24 hours in the event of a traumatic tap
 - Time from instrumentation to systemic heparinization should exceed 60 minutes
 - Epidural catheters should be removed when normal coagulation is restored
 - Subcutaneously Heparin
 - Low dose heparin 5000 units subcutaneously q12 hours may be used. If therapy last longer than 4 days, platelets should be monitored prior to neuraxial block and catheter removal.
- Systemic Thrombolytics
 - Patients receiving fibrinolytic and thrombolytic drugs should be cautioned against receiving spinal or epidural anesthetics except in highly unusual circumstances. Data are not available to clearly outline the length of time neuraxial puncture should be avoided after discontinuation of these drugs.