

Consensus Statements: Anticoagulation and Neuraxial Block

The American Society of Regional Anesthesia (ASRA) convened a group of experts in the fields of hemostasis, biostatistics, neuraxial anesthesia, and federal drug regulation to participate in a consensus conference on anticoagulants and neuraxial anesthesia and analgesia. The original manuscripts that developed from the consensus conference held May 2-3, 1998, in Chicago, IL, were published as a supplement to *Regional Anesthesia and Pain Medicine*, 1998. The ASRA Anticoagulation Consensus Guidelines 3rd Edition have recently been updated, and are available at www.asra.com or Horlocker TT, Wedel DJ, Rowlingson JC, et al. *Reg Anesth Pain Med* 2010;35:64-101

Oral Anticoagulants and Neuraxial Block

When oral anticoagulation therapy and neuraxial anesthesia are used together, physicians must be aware of the interactions of warfarin on the coagulation cascade and the role of the prothrombin time and INR in monitoring its effect.

1. For patients on chronic oral anticoagulation, the anticoagulant therapy must be stopped and the prothrombin time (INR) measured prior to initiation of neuraxial block. Early after discontinuation of warfarin therapy, the prothrombin time and the INR reflect predominantly factor VII levels, and in spite of acceptable factor VII levels, factors II and X levels may not be adequate for normal hemostasis.
2. The concurrent use of medications that affect other components of the clotting mechanisms may increase the risk of bleeding complications for patients receiving oral anticoagulants, and do so without influencing the prothrombin time and INR. These medications include aspirin and other NSAIDs and heparin. One should reflect on these drug interactions when an indwelling neuraxial catheter is being considered for a patient.
3. For patients receiving an initial dose of warfarin prior to surgery, the prothrombin time and INR should be checked prior to neuraxial block if the first dose was given more than 24 hours earlier or if a second dose of oral anticoagulant has been administered.
4. Patients receiving low-dose warfarin therapy during epidural analgesia should have their prothrombin time and INR monitored on a daily basis, and checked before catheter removal, if initial dose of warfarin was more than 36 hours before. Initial studies evaluating the safety of epidural analgesia in association with oral anticoagulation utilized low-dose warfarin, with the mean daily doses of approximately warfarin 5 mg. Higher-dose warfarin may require more intensive monitoring of the coagulation status.
5. Neurologic testing of sensory and motor function should be performed routinely during epidural analgesia for patients on warfarin therapy. The type of analgesia solution should be tailored to minimize the degree of sensory and motor blockade. These checks should be continued after catheter removal for at least 24 hours, and longer if the INR was >1.5 at the time of catheter removal.

An INR > 3 should prompt the physician to withhold or reduce the warfarin dose in patients with indwelling neuraxial catheters. There is no definitive recommendation for removal of neuraxial catheters in patients with therapeutic levels of anticoagulation during a neuraxial catheter infusion. Caution must be exercised in making decisions about removing or maintain these catheters.

6. Reduced doses of warfarin should be given to patients who are likely to have an enhanced response to the drug.

Enneking KF, Benzon HT. Oral Anticoagulants and Regional Anesthesia: A Perspective. *Reg Anesth Pain Med* 1998.

Standard Heparin and Neuraxial Block

Therapeutic and full anticoagulation doses of standard (unfractionated) heparin are commonly used during the perioperative period in vascular surgery and cardiac surgery patients. Low-dose heparin also is frequently used for prophylaxis against development of venous thromboembolism in general, orthopedic, and urologic surgery.

During subcutaneous (mini-dose) prophylaxis there is no contradiction to use of neuraxial techniques. The risk of neuraxial bleeding may be reduced by delay of the heparin injection until after the block and may be increased in debilitated patients.

1. Combining neuraxial techniques with intraoperative anticoagulation with heparin, vascular surgery seems acceptable with the following cautions:
 - a) Avoid the technique in patients with other coagulopathies.
 - b) Heparin administration should be delayed for 1 hour after needle placement.
 - c) Remove the catheter 1 hour before any subsequent heparin administration or 2-4 hours after the last heparin dose. Monitor the patient postoperatively to provide early detection of motor blockade, and consider use of minimal concentration of local anesthetics to enhance the early detection of a spinal hematoma.
 - d) Although the occurrence of a bloody or difficult neuraxial needle placement may increase risk, there is no data to support mandatory cancellation of a case. Clinical judgment is needed. If a decision is made to proceed, full discussion with the surgeon and careful postoperative monitoring are warranted.
2. Currently, sufficient data and experience are not available to determine if the risk of neuraxial hematoma is increased when combining neuraxial techniques with the full anticoagulation of cardiac surgery.
3. Prolonged therapeutic anticoagulation appears to increase risk of spinal hematoma formation, especially if combined with other anticoagulants or thrombolytics. Therefore, neuraxial blocks should be avoided in this clinical setting. Whereas, if systematic anticoagulation therapy is begun with an epidural catheter in place, it is recommended to delay catheter removal for 2-4 hours following therapy discontinuation and evaluation of coagulation status.
4. The concurrent use of medications that affect other components of the clotting mechanisms may increase the risk of bleeding complications for patients receiving standard heparin. These medications include aspirin and other NSAID, LMWH, and oral anticoagulants.

Low Molecular Weight Heparin and Neuraxial Block

Anesthesiologists in the United States can draw upon the European experience to develop their own practice guidelines for the management of patients undergoing spinal and epidural blocks while receiving perioperative LMWH.

1. Monitoring of the anti-Xa level is not recommended. The anti-Xa level is not predictive of the risk of bleeding and is not helpful in the management of patients undergoing neuraxial blocks.
2. Antiplatelet or oral anticoagulant medications administered in combination with LMWH may increase the risk of spinal hematoma. Concomitant administration of medications affecting hemostasis such as antiplatelet drugs, standard heparin, or dextran represents an additional risk of hemorrhagic complications perioperatively including spinal hematoma. Education of the entire patient care team is necessary to avoid potentiation of the anticoagulant effects.
3. The presence of blood during needle and catheter placement does not necessitate postponement of surgery. However, initiation of LMWH therapy in this setting should be delayed for 24 hours postoperatively. Traumatic needle or catheter placement may signify increased risk of spinal hematoma, and it is recommended that this consideration be discussed with the surgeon.

4. Patients on preoperative LMWH can be assumed to have altered coagulation. A single-dose spinal anesthetic may be the safest neuraxial technique in patients receiving preoperative LMWH. In these patients, needle placement should occur at least 10-12 hours after the LMWH dose. Patients receiving higher doses of LMWH (e.g. enoxaparin 1mg/Kg twice daily) will require longer delays (24 hours). Neuraxial techniques should be avoided in patients administered a dose of LMWH 2 hours preoperatively (general surgery patients) since needle placement occurs during peak anticoagulant activity.
5. Patients with postoperative initiation of LMWH thromboprophylaxis may safely undergo single dose and continuous catheter techniques. The first dose of LMWH should be administered no earlier than 24 hours postoperatively. It is recommended that indwelling catheters be removed prior to initiation of LMWH. If a continuous technique is selected, the epidural catheter may be left indwelling overnight and removed the following day, with the first dose of LMWH administered 2 hours after catheter removal.
6. The decision to implement LMWH thromboprophylaxis in the presence of an indwelling catheter must be made with care. Extreme vigilance of the patient's neurologic status is warranted. An opioid or dilute local anesthetic solution is recommended in these patients in order to allow frequent monitoring of neurologic function. If epidural analgesia is anticipated to continue for more than 24 hours, LMWH administration may be delayed (in selected cases), or an alternate method of thromboprophylaxis may be selected (e.g. external pneumatic compression) based on the risk profile for the individual patient. These decisions should be made preoperatively to allow optimal management of both postoperative analgesia and thromboprophylaxis.
7. For any LMWH prophylaxis regimen, timing of catheter removal is of paramount importance. Catheter removal should be delayed for at least 10 to 12 hours after a dose of LMWH. A true normalization of the patient's coagulation status could not be achieved if the evening dose of LMWH was not given and the catheter was removed the following morning (24 hours after the last dose). Again, subsequent dosing should not occur for at least 2 hours after catheter removal.