

## Management of perioperative antithrombotic therapy

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### **Aspirin:** (Level of evidence: fair)

1. Low-risk coronary patients-stop aspirin a week before surgery
2. High cardiac risk patients-TIA, CVA, coronary stent, coronary disease, cerebrovascular disease, vascular, etc. - aspirin will not be discontinued, regional anesthesia can be performed.
3. If the surgeon or the anesthesiologist do not want to operate in the presence of aspirin - both regional anesthesia and surgery can be performed two days after stopping the drug - when 20% of COX-1 activity in platelets has been recovered.
4. Patients in whom aspirin was not discontinued for any reason - can have surgery and can receive regional anesthesia.

### **Low molecular weight heparin - Enoxaparin (Clexan)** (Level of evidence: expert opinion):

1. Single - dose prophylaxis -Daily 40 mg or 60 mg per day - have to wait 10 hours before performing regional anesthesia.
2. Full treatment given twice daily (any dose), or high dose of 1 mg/kg per day, please wait 24 hours before performing regional anesthesia (but not less than 18 hours).
3. A parallel anticoagulant therapy or antiplatelets, such as aspirin, dextrane, etc. or in renal dysfunction, require waiting 24 hours before regional anesthesia.
4. Postoperative renewal with low dose LMWH - 6 hours after surgery (if there was bleeding at the time of epidural - then wait 24 hours). High - dose renewal of LMWH will start after 24 hours.
5. If an epidural catheter was left, it can be taken out 10 to 12 hours after the last dose of LMWH.
6. Neurological tests should be performed at 12 hours after removing the epidural catheter.
7. LMWH could be given 6 hours after removing an epidural catheter.

8. In hypercoagulable patients please consider whether to cease LMWH medication and adjust anesthesia accordingly (general or regional).

### **Heparin (unfractionated):** Level of evidence: expert opinion)

1. SC heparin injection - two hours wait before making regional anesthesia.
2. After cessation of IV heparin therapy, please wait 4 hours before performing regional anesthesia.
3. If patient is treated with heparin for 5 days, platelet count is mandatory in order to monitor for HIT - II before initiating regional anesthesia.
4. PTT test should be performed prior to anesthesia.
5. Providing SC or low dose IV heparin after performing epidural anesthesia - wait one hour (6 hours for high dose).
6. Removing an epidural catheter after heparin - wait 4 hours.
7. Kidney failure requires a longer wait - after reviewing that PTT is in the normal range.

### **Warfarin and other vitamin K antagonists:** (Level of evidence: expert opinion)

1. Warfarin should be stopped 5 days before surgery.
2. Because of hypercoagulability tendency after drug cessation, a short - acting bridging anticoagulant therapy (heparin or LMWH) should be started when INR = 2 until the day of surgery.
3. Regional anesthesia can be performed when the INR does not exceed 1.4.
4. Epidural catheter should be removed before the renewal of warfarin therapy. If therapy was inadvertently started, INR is usually not affected in the first 48 hours. On day 1 epidural catheter can be withdrawn, on day 2, please consider platelets infusion prior to catheter withdrawal.
5. If a continuous epidural therapy is offered, INR should be kept less than 3. Before removing the catheter, warfarin therapy should be halted to INR < 1.4 before removing the epidural catheter.

6. During continuous epidural use, in the presence of warfarin therapy, neurological status should be performed frequently up to 24 Hours after removing the catheter.
7. Neutralizing the action of warfarin by providing vitamin K or giving plasma is not recommended, unless the surgery is urgent.

## ANTIPLATELETS THERAPY

**Platelet ADP receptor blockers:** clopidogrel (Plavix) and ticlopidine (Ticlidil)

Clopidogrel administration in patients with coronary stent or for vascular preventive care:

Definitions: ADP receptor blocker will inhibit platelets for their whole life span.

**Bare metal coronary stent** – Has no protective layer which prevents endothelial regeneration.

Antithrombotic therapy is necessary for two months, and not less than three weeks, until the stent is endothelialized.

**Drug eluting stent** is coated with anti proliferative material that prevents endothelial regeneration.

Thus, the stent remains exposed for a long period of time. Ceasing the antithrombotic therapy prematurely could cause acute stent thrombosis - the most dangerous situation with high mortality.

Antithrombotic therapy must continue for at least six months and preferably for a year, and not less than 3 months. Monotherapy with aspirin should follow for the life span.

### Instructions

1. Clopidogrel should be stopped a week before surgery, and not less than 5 days before surgery.
2. Patient with bare metal stent who is scheduled for an elective surgery and is treated with aspirin and clopidogrel, surgery should be postponed for at least two

months from insertion time. If surgery is urgent, please wait about three weeks since stent insertion.

3. Patient with drug eluting stent who are on aspirin and clopidogrel, and planed for elective surgery, surgery should be postponed for at least 6 months. If surgery is urgent, please wait three months after stent insertion.
4. Patient receiving prophylactic clopidogrel:
  - Prevention of CVA, 6 months after the event
  - 6 weeks after myocardial infarction
  - Peripheral vascular disease
  - Arrhythmia (atrial fibrillation)

- A. Stop clopidogrel before surgery, but continuation of aspirin therapy is recommended.
- B. Consider risks of drug cessation versus risks of operation performed in the presence of the drug. The patient and his family should be informed about the risk of increased surgical bleeding and postoperative complications and all should be recorded in the chart.
- C. Anticoagulant therapy (heparin or LMWH) is started during clopidogrel cessation, bleeding, hazards should be considered.
- D. Urgent surgery can be performed 3 days after clopidogrel cessation, but under general anesthesia. No recommendations exist regarding performance of nerve block.
- E. Emergent surgery will be performed while antithrombotic therapy is still active, but patient should be informed on expected bleeding complications. If surgery is performed:

1. Regional anesthesia is prohibited
2. Blood and platelets should be ordered to deal with anticipated bleeding
3. Giving platelets does not guarantee control of bleeding - their action under such conditions is unpredictable.
4. PACU duration of stay will be at least 3 hours with strict bleeding control.

My suggested protocol for interrupting antiplatelet therapy prior to surgery is the following:

	Prophylactic clopidogrel	BMS	DES
Elective surgery	Stop for 1 week (ticlopidine 2W)	6 to 8 weeks	6 month to 1 year
Elective semi-urgent	Stop for 5 days (7 days for regional anesthesia)	3 to 4 weeks	Not less than 3 month
Urgent R/B	Stop for 3 days or surgery with antiplatelets	Stop for 3 days or surgery with antiplatelets	Keep antiplatelets
Emergent surgery R/B	Keep antiplatelets	Keep antiplatelets	Keep antiplatelets

R/B = Risk/Benefit considerations

BMS - Bare metal stent

DES - Drug eluting stent

**IIb/IIIa receptor antagonists:** abciximab (ReoPro), eptifibatide (Integrilin), tirofiban (Aggrastat) - reversible platelet blockers

1. Are shorter-acting and better antagonized by platelets.
2. Regional anesthesia can be performed 48 hours after stopping abciximab, 8 hours after the cessation of integrilin or Aggrastat.
3. Platelet count should be performed before performing regional anesthesia because of the drug tendency to cause thrombocytopenia

## SUGGESTED LITERATURE

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6. Regional anesthesia in the anticoagulated patient: defining the risks (the second ASRA Consensus Conference on Neuraxial Anesthesia and Anticoagulation).
7. Horlocker TT, Wedel DJ, Benzon H, et al. Regional anesthesia in the anticoagulated patient: Defining the risks (The Second ASRA Consensus Conference on Neuraxial Anesthesia and Anticoagulation). *Reg Anesth Pain Med* 2003;28:172-97.