**Perioperative Management of Antithrombotic Therapy**

Evaluating perioperative continuation of antiplatelet agents (e.g., aspirin, clopidogrel) based on comorbidities, presence and type of coronary stents and cardiac risk of procedure. Consider Cardiology consult.

<table>
<thead>
<tr>
<th>Risk of Perioperative Venous Thromboembolism (See Suggested Stratification Table Below)</th>
<th>Pre-Procedure Day (For Procedures that Require Normalization of INR)</th>
<th>Day of Surgery/Procedure</th>
<th>Post-Procedure Management (AFTER Adequate Hemostosis)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>–5</td>
<td>–4</td>
<td>–3</td>
</tr>
<tr>
<td>High</td>
<td>Stop warfarin 5 days pre-op. Test INR 1-2 days prior to surgery. If INR &gt; 1.5, consider vitamin K 2.5 mg PO x 1 dose. Reassess INR on day of surgery. Bridge with treatment dose IV unfractionated heparin or subcutaneous (SC) enoxaparin.</td>
<td>If INR &gt; 1.5, consider vitamin K 2.5 mg PO x 1 dose.</td>
<td>Last pre-op dose: - Stop IV heparin 4 h pre-op - 50% total dose enoxaparin 24 h pre-op (e.g., AM dose of enoxaparin 24 h pre-op if q12h regimen)</td>
</tr>
<tr>
<td>Moderate</td>
<td>Stop warfarin 5 days pre-op. Test INR 1-2 days prior to surgery. If INR &gt; 1.5, consider vitamin K 2.5 mg PO x 1 dose. Reassess INR on day of surgery. Bridge with treatment dose IV unfractionated heparin or SC enoxaparin, or low-dose SC enoxaparin.</td>
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</tr>
<tr>
<td>Low</td>
<td>Test INR 1-2 days prior to surgery. If INR &gt; 1.5, consider vitamin K 2.5 mg PO x 1 dose. Reassess INR on day of surgery. Bridge with low-dose SC enoxaparin or no bridge.</td>
<td></td>
<td>Last pre-op dose: - Stop enoxaparin 24 h pre-op</td>
</tr>
</tbody>
</table>

### Suggested Patient Risk Stratification for Perioperative Thromboembolism

#### Risk Level

- **High**
  - (> 10% risk arterial TE per year)
  - Any mitral valve prosthesis
  - Older (caged-ball or tilting disc)
  - Aortic valve prosthesis
  - Recent (within 6 mo) stroke or TIA
  - Rheumatic valvular heart disease
  - Severe thrombophilia (e.g., deficiency of protein C, protein S or antithrombin, antiphospholipid antibodies, or multiple abnormalities)

- **Moderate**
  - (4-10% risk arterial TE per year)
  - Bileaflet aortic valve prosthesis and one of the following: atrial fibrillation, prior stroke or TIA, hypertension, diabetes, congestive heart failure, age > 75 years
  - CHADS2 score of 3 or 4
  - VTE within the past 3 to 12 mo
  - Nonsevere thrombophilic conditions
  - Recurrent VTE
  - Active cancer (treated within 6 mo or palliative)

- **Low**
  - (< 4% risk of arterial TE per year)
  - Bileaflet aortic valve prosthesis without atrial fibrillation and no other risk factors for stroke
  - CHADS2 score of 0 to 2 (and no prior stroke or TIA)
  - Single VTE occurred > 12 mo ago and no other risk factors

### Indication for Warfarin Therapy

- **Mechanical Heart Valve**
  - CHADS2 score of 5 or 6
- **Atrial Fibrillation**
  - Recent (within 3 mo) stroke or TIA

### Venous Thromboembolism

- Recent (within 3 mo) VTE
  - Severe thrombophilia (e.g., deficiency of protein C, protein S or antithrombin, antiphospholipid antibodies, or multiple abnormalities)

### Pre-Procedure Day

- **Day of Surgery/Procedure**
  - **High**
    - Stop warfarin 5 days pre-op.
    - Test INR 1-2 days prior to surgery. If INR > 1.5, consider vitamin K 2.5 mg PO x 1 dose. Reassess INR on day of surgery. Bridge with treatment dose IV unfractionated heparin or subcutaneous (SC) enoxaparin.
  - **Moderate**
    - Stop warfarin 5 days pre-op.
    - Test INR 1-2 days prior to surgery. If INR > 1.5, consider vitamin K 2.5 mg PO x 1 dose. Reassess INR on day of surgery. Bridge with treatment dose IV unfractionated heparin or SC enoxaparin, or low-dose SC enoxaparin.
  - **Low**
    - Test INR 1-2 days prior to surgery. If INR > 1.5, consider vitamin K 2.5 mg PO x 1 dose. Reassess INR on day of surgery. Bridge with low-dose SC enoxaparin or no bridge.

### Post-Procedure Management

- **Resume warfarin 12-24 h post-op when adequate hemostasis.**
  - Assess INR at start of warfarin, then in 2-3 days after re-initiation of warfarin. (Anticipate INR > 1.5 in 48 hrs.)

### Bleeding Risk Considerations for Post-Op Anticoagulation Plan

- **High Risk / Major Surgery**
  - (e.g., Cardiac, neurological, urologic, major orthopedic)
  - If post-op treatment anticoagulation planned.
  - - Delay initiation of treatment dose heparin/enoxaparin for 48-72 h post-op and hemostasis secured OR
  - - Give low-dose heparin/enoxaparin when hemostasis secured, OR
  - - Avoid heparin/enoxaparin in post-op period and restart warfarin only.

- **Low Risk / Minor Surgery**
  - Resume treatment dose enoxaparin 24 h post-op when hemostasis secured.

- **Minor Dental or Dermatologic Procedures OR Cataract Removal**
  - May continue warfarin during procedure.

- **Urgent Surgery or Other Invasive Procedure**
  - Stop warfarin prior to surgery/procedure.
  - Give Vitamin K 2.5 – 5 mg PO IV infusion. For immediate reversal, consider fresh frozen plasma also.
  - If excessive or life-threatening bleeding, consider administration of prohemostatic agent. Consider consultation with Blood Bank and/or Hematology Service.

### WARNING: SPINAL / EPIDURAL HEMATOMAS

Enoxaparin use in patients undergoing neuraxial anesthesia (epidural/spinal anesthesia) or spinal puncture increases risk of developing epidural or spinal hematomas that may result in long-term or permanent paralysis.

- Hold enoxaparin treatment doses ≥ 24 hours before epidural needle/catheter insertion
- Hold enoxaparin prophylaxis doses ≥ 12 hours before epidural needle/catheter insertion
- DO NOT remove catheter until ≥ 12 hours after last enoxaparin dose
- DO NOT restart enoxaparin until ≥ 2 hours after needle/catheter removal

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[Note: Tranexamic acid (Cyklokapron®) is an alternative not available at University Hospital of Brooklyn.]