How and When to Stop Blood Thinners for Surgery

*elective surgeries only

Lana Castellucci MD FRCPC MSc
## Disclosures

Disclosures of: Lana Castellucci

<table>
<thead>
<tr>
<th>Category</th>
<th>Conflict of Interest</th>
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<tbody>
<tr>
<td>Employment</td>
<td>No conflict of interest to disclose</td>
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<tr>
<td>Research support</td>
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<td>Speakers bureau</td>
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<td>Patents</td>
<td>No conflict of interest to disclose</td>
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<tr>
<td>Honoraria</td>
<td>Bayer, BMS, Pfizer, Leo Pharma</td>
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<tr>
<td>Travel support</td>
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<td>Other</td>
<td>No conflict of interest to disclose</td>
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Presentation includes discussion of the following off-label use of a drug or medical device: N/A
Objectives

• Review indications for stopping anticoagulation for surgery

• Review when/timing to stop anticoagulants for surgery
  – Warfarin and direct oral anticoagulants

• How research and patient participation guides decision making
Indications for Anticoagulation

• Venous thromboembolism (VTE) treatment
  – PE
  – DVT
• VTE prevention after orthopedic surgery
• Atrial Fibrillation (AF)
  – Stroke prevention
• Mechanical heart valves
Types of Anticoagulants

- Injections/needles - LMWH
  - Bridging during surgery
- Pills
  - AF
  - VTE prevention and treatment
  - Mechanical heart valves
Perioperative Anticoagulation

• 78 woman with Atrial Fibrillation
• Left knee replacement in 1 week
• Medical history:
  – high blood pressure, high cholesterol
• Medications:
  – warfarin for stroke prevention
  – Ramipril
  – Rosuvastatin
Perioperative Anticoagulation 2

• Warfarin needs to be stopped for surgery
• When to stop it?
• Does the patient need a shorter acting blood thinner while off warfarin?
• What are the bleeding risks of surgery?
• What are the clotting risks for the patient?
Bridging Anticoagulation

• Warfarin is stopped 5 days before surgery
  – Slowly metabolizes out of the body
• Giving a short acting anticoagulant (LMWH) before and/or after surgery to minimize the time a patient is not anticoagulated
• Risks of bridging:
  – 3% risk for major bleeding
  – 10-15% risk for minor bleeding
Bleeding Risks

**HIGH:**
- Any surgery or procedure with neuraxial (spinal or epidural) anesthesia
- Neurosurgery (intracranial or spinal)
- Cardiac surgery (e.g. CABG, heart valve replacement)
- Major intra-abdominal surgery
- Major vascular surgery (e.g. aortic aneurysm repair, aortofemoral bypass)
- Major orthopaedic surgery (e.g. hip or knee replacement)
  - Lung resection surgery
  - Urological surgery (e.g. prostatectomy, bladder tumour resection)
  - Extensive cancer surgery (e.g. pancreas, liver)
  - Intestinal anastomosis surgery
  - Reconstructive plastic surgery
  - Selected procedures (e.g. kidney biopsy, prostate biopsy, cervical cone biopsy, percutaneous, colonic polypectomy)

**MODERATE:**
- Other intra-abdominal surgery (e.g., laparoscopic cholecystectomy or hernia repair)
- Other general surgery (e.g. breast)
- Other intrathoracic surgery
- Other orthopedic surgery
- Other vascular surgery
- Non-cataract ophthalmologic surgery
- Gastroscopy or colonoscopy with biopsies
- Selected procedures (e.g. bone marrow biopsy, lymph node biopsy)
- Complex dental procedure (e.g. multiple tooth extractions)
Bleeding Risks

Low (Non-Dental):
- Cataract surgery
- Dermatologic procedures (e.g. biopsy)
- Gastroscopy or colonoscopy without biopsies
- Coronary angiography
- Permanent pacemaker insertion or internal defibrillator placement (if bridging anticoagulation is not used)
- Selected procedures (e.g. thoracentesis, paracentesis, arthrocentesis)

Low (Dental):
- Dental extractions (1 or 2 teeth)
- Endodontic (root canal) procedure
- Subgingival scaling or other cleaning
Clotting Risks

HIGH THROMBOEMBOLIC RISK (BRIDGING ANTICOAGULATION SUGGESTED):
- any mechanical prosthetic mitral valve
- older generation (cage-ball, tilting disc) mechanical aortic valve
- chronic atrial fibrillation (valvular or non-valvular) with a CHADS₂ score* of 5-6
- recent (within 3 months) arterial thromboembolism (stroke, systemic embolism, transient ischemic attack [TIA])
- recent (within 3 months) venous thromboembolism (deep vein thrombosis, pulmonary embolism)†
- prior arterial or venous thromboembolism during appropriate interruption of warfarin
- severe thrombophilia with history of venous thromboembolism (e.g. deficiency of protein C, protein S or antithrombin, antiphospholipid syndrome)

INTERMEDIATE THROMBOEMBOLIC RISK (BRIDGING ANTICOAGULATION OPTIONAL AND BASED ON INDIVIDUAL PATIENT CHARACTERISTICS):
- newer generation (bileaflet) mechanical aortic valve
- prior arterial or venous thromboembolism within last 3-12 months

LOW-RISK (BRIDGING ANTICOAGULATION IS NOT RECOMMENDED):
- chronic atrial fibrillation (valvular or non-valvular) with a CHADS₂ score* of 0-4
- prior venous thromboembolism over 12 months ago
- bioprosthetic heart valve
Clotting Risks 2

CHADS₂ score

- 1 point for **Congestive Heart Failure**
- 1 point for **Hypertension**
- 1 point for **Age ≥ 75 years**
- 1 point for **Diabetes Mellitus**
- 2 points for Prior **Stroke or TIA**

<table>
<thead>
<tr>
<th>CHADS₂ Score*</th>
<th>Stroke Rate, %/yr (95 %CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.9 (1.2 – 3.0)</td>
</tr>
<tr>
<td>1</td>
<td>2.8 (2.0 – 3.8)</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td><strong>4.0 (3.1 – 5.1)</strong></td>
</tr>
<tr>
<td>3</td>
<td>5.9 (4.6 – 7.3)</td>
</tr>
<tr>
<td>4</td>
<td>8.5 (6.3 – 11.1)</td>
</tr>
<tr>
<td>5</td>
<td>12.5 (8.2 – 17.5)</td>
</tr>
<tr>
<td>6</td>
<td>18.2 (10.5 – 27.4)</td>
</tr>
</tbody>
</table>

*Score 0: Patients can be administered aspirin
*Score 1: Patients can be administered aspirin or anticoagulant therapy
*Score ≥2: Patients should be administered anticoagulant therapy

Perioperative Bridging Anticoagulation in Patients with Atrial Fibrillation

Direct Oral Anticoagulants and Surgery

• Ongoing studies in this area
• Decisions about managing DOACs are based on:

Drug elimination half-life (with normal renal function),
Effect of renal function on drug elimination half-life, and
Bleeding risk associated with the surgery/procedure type, and
Whether patient is to receive spinal/epidural anesthesia.
Preoperative Management of DOACs

<table>
<thead>
<tr>
<th>DRUG (DOSE REGIMEN)</th>
<th>RENAL FUNCTION</th>
<th>MINOR SURGERY/PROCEDURE* (LOW BLEEDING RISK)</th>
<th>MAJOR SURGERY/PROCEDURE INCLUDING NEURAXIAL PROCEDURES**† (HIGH BLEEDING RISK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dabigatran (twice daily)</td>
<td>Normal renal function or mild impairment (CrCl ≥50 mL/min) t₁/₂ 7-17 hours</td>
<td>Give last dose 2 days before surgery/procedure (i.e. skip 2 doses)</td>
<td>Give last dose 3 days before surgery/procedure (i.e. skip 4 doses)</td>
</tr>
<tr>
<td></td>
<td>Moderate renal impairment (CrCl 30-49 mL/min) t₁/₂ 17-20 hours</td>
<td>Give last dose 3 days before surgery/procedure (i.e. skip 4 doses)</td>
<td>Give last dose 5 days before surgery/procedure (i.e. skip 8 doses)</td>
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### Preoperative Management of DOACs 2

<table>
<thead>
<tr>
<th>DOAC</th>
<th>Dosage Regimen</th>
<th>Normal Renal Function</th>
<th>Give Last Dose</th>
<th>Give Last Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rivaroxaban</strong> (once daily)</td>
<td>Normal renal function, mild or moderate impairment (CrCl ( \geq 30 \text{ mL/min} )) t(_{1/2} ) 7-11 hours</td>
<td></td>
<td>2 days before surgery/procedure (i.e. skip 1 dose)</td>
<td>3 days before surgery/procedure (i.e. skip 2 doses)</td>
</tr>
<tr>
<td><strong>Apixaban</strong> (twice daily)</td>
<td>Normal renal function, mild or moderate impairment (CrCl ( \geq 30 \text{ mL/min} )) t(_{1/2} ) 8-12 hours</td>
<td></td>
<td>2 days before surgery/procedure (i.e. skip 2 doses)</td>
<td>3 days before surgery/procedure (i.e. skip 4 doses)</td>
</tr>
</tbody>
</table>

*No anticoagulant taken on the day of surgery/procedure.
†Neuraxial procedures include spinal anesthesia, epidural catheter insertion and epidural catheter removal.
### Postop Management of DOACs

<table>
<thead>
<tr>
<th>DRUG</th>
<th>Minor Surgery/Procedure (Low Bleeding Risk)</th>
<th>Major Surgery/Procedure (High Bleeding Risk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dabigatran</td>
<td>Resume on day after surgery (~24 hours post-operative)</td>
<td>Resume 2 days after surgery (~48 hours post-operative)</td>
</tr>
<tr>
<td>Rivaroxaban</td>
<td>Resume on day after surgery (~24 hours post-operative)</td>
<td>Resume 2 days after surgery (~48 hours post-operative)</td>
</tr>
<tr>
<td>Apixaban</td>
<td>Resume on day after surgery (~24 hours post-operative)</td>
<td>Resume 2 days after surgery (~48 hours post-operative)</td>
</tr>
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Perioperative Anticoagulation Studies

• PAUSE study
  – Patients with Atrial Fibrillation that need surgery
  – On DOAC
  – Canadian study

• Periop 2
  – Patients with Atrial Fibrillation or mechanical heart valve that need surgery
  – On warfarin
  – Canadian study; completed
Patients and Research

• Patients are an important contributor to our research
• We want your feedback
Patient resources:

• Thrombosis Canada: [www.thrombosiscanada.ca](http://www.thrombosiscanada.ca)
• Clots Matter: [www.clotsmatter.ca](http://www.clotsmatter.ca)
• World Thrombosis Day: [www.worldthrombosisday.org](http://www.worldthrombosisday.org)