Perioperative Anticoagulation

Harry Gibbs FRACP FCSANZ
The Alfred
Melbourne
## Global Burden of Disease 2015

<table>
<thead>
<tr>
<th></th>
<th>Deaths (millions)</th>
<th>Prevalence (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial infarction / AF / Stroke</td>
<td>15.4</td>
<td>186.7</td>
</tr>
<tr>
<td>Neoplasms</td>
<td>8.7</td>
<td>90.5</td>
</tr>
</tbody>
</table>

232 million operations performed in 2013
• Thrombosis - the commonest cause of death and disability worldwide
• Anti-thrombotic therapy is very beneficial
• Anti-thrombotic therapy increases bleeding
• Surgery is common
• Surgery promotes thrombosis
• Managing anticoagulation in the peri-operative period is common and important!
My Talk Today

• Don’t over estimate the thrombosis risk
• Bleeding is bad
• Bridge very infrequently
• Usually continue aspirin
Elective Surgery
Step 1

- Assess bleeding risk and consequences
  - Surgical factors
  - Patient factors
Low Risk Procedures

• Dental extractions
• Cardiac device implantation
• Cataract surgery
• Diagnostic laparoscopy

Extensive list at: http://jaccjacc.acc.org/Clinical_Document/PMAC_Online_Appendix.pdf
Patient Risk Factors For Bleeding

- Prior bleeding
- Advanced age
- Severe liver or kidney dysfunction
- Abnormal platelet function

Extensive list at: http://jaccjacc.acc.org/Clinical_Document/PMAC_Online_Appendix.pdf
• For low bleeding risk
  • Continue anti-thrombotic therapy and perform procedure
If bleeding risk is not low....
• If on oral anticoagulants
  • If on vitamin K antagonist - determine if bridging is required
  • If on NOAC - never bridge; determine when to stop NOAC
Routine Bridging

Yong et al. BMC Cardiovascular Disorders (2017) 17:295
DOI 10.1186/s12872-017-0719-7

Periprocedural heparin bridging in patients receiving oral anticoagulation: a systematic review and meta-analysis

Jing Wen Yong¹, Li Xia Yang¹, Bright Eric Ohene¹, Yu Jie Zhou¹ and Zhi Jian Wang¹,²*

25 studies
35,944 patients
## Routine Bridging

<table>
<thead>
<tr>
<th>Event</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major bleeding</td>
<td>3.23 (2.06 - 5.05)</td>
</tr>
<tr>
<td>Overall bleeding</td>
<td>2.83 (1.86 - 4.30)</td>
</tr>
<tr>
<td>Thromboembolism</td>
<td>0.99 (0.49 - 2.00)</td>
</tr>
<tr>
<td>Mortality</td>
<td>0.71 (0.31 - 1.65)</td>
</tr>
</tbody>
</table>

*Yong et al. BMC Cardiovascular Disorders (2017) 17:295 DOI 10.1186/s12872-017-0719-7*
When to consider bridging

- AF with very high stroke risk (Mitral stenosis, CHA\textsubscript{2}DS\textsubscript{2}Vasc score >6 or SSE within 3 months)
- Recent acute VTE (within 3 months)
- Mechanical heart valve
  - All except bileaflet aortic with no other stroke risk
• How to bridge
  • Stop VKA 5 days pre-op
  • Start LMWH or UFH 3 days pre-op
  • Stop LMWH 24 hours pre-op; stop UFH 4 hours pre-op
• Most patients require cessation of OAC but no bridging
When to stop

- VKA
  - 5 days pre-op, or
  - Give vitamin K (3 mg IV) 18 hours pre-op
When to stop

• NOAC

  • Generally 48 hours pre-op

  • 72 hours if CKD and dabigatran or very high risk or consequences of bleeding
Pre-op coagulation monitoring

- Not required routinely

<table>
<thead>
<tr>
<th>Drug</th>
<th>Test</th>
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<tr>
<td>VKA</td>
<td>INR</td>
</tr>
<tr>
<td>Dabigatran</td>
<td>Dilute thrombin clotting time</td>
</tr>
<tr>
<td>Rivaroxaban / apixaban</td>
<td>Xa level</td>
</tr>
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</table>
After the procedure

• Use VTE prophylaxis as required
• Recomence OAC when bleeding risk is low
  • VKA next day
  • NOAC 2 - 3 days
• Don’t forget to talk to the surgeon
Perioperative interruption of direct oral anticoagulants in patients with atrial fibrillation: A systematic review and meta-analysis

Joseph R. Shaw MD¹ | Jason D. Woodfine MD¹ | James Douketis MD² | Sam Schulman MD² | Marc Carrier MD, MSc, FRCPC¹

Thrombosis rate 0.4%
Perioperative Bridging Anticoagulation in Patients with Atrial Fibrillation


<table>
<thead>
<tr>
<th>Outcome</th>
<th>No Bridging (N = 918)</th>
<th>Bridging (N = 895)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number of patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(percent)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Primary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arterial thromboembolism</td>
<td>4 (0.4)</td>
<td>3 (0.3)</td>
<td>0.01*, 0.73†</td>
</tr>
<tr>
<td>Stroke</td>
<td>2 (0.2)</td>
<td>3 (0.3)</td>
<td></td>
</tr>
<tr>
<td>Transient ischemic attack</td>
<td>2 (0.2)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Systemic embolism</td>
<td>0</td>
<td>0</td>
<td></td>
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</table>
Bleeding is bad

- Those who bleed have thrombotic complications
  - Longer discontinuation of anti-thrombotic therapy
  - Additional procedures are often required
  - Immobility is frequent
Antiplatelet agents
Aspirin

- Conflicting data
- Some studies show no change in major bleeding, others an increase
- Not much effect on thrombosis
Aspirin in Patients Undergoing Noncardiac Surgery


No increase in bleeding and no decrease in CV events in patients continuing aspirin
Aspirin

• Continue unless high bleeding risk or consequences
  • Neurosurgery
  • Prostate surgery
Dual Antiplatelet Therapy

- A higher risk group
- More bleeding with DAPT
- Risk highest early after stent placement or ACS
- Try and defer elective surgery
- Otherwise continue aspirin and stop the P2Y$_{12}$ inhibitor
P2Y\textsubscript{12} inhibitor interruption after PCI for elective non-cardiac surgery

ACS at index PCI or other high ischaemic risk features?

Time from DAPT initiation

- No
  - 1 mo.: Class IIa B
  - 6 mo.: Class I B

- Yes
  - 1 mo.: Class III B
  - 6 mo.: Class III B [Note: Class III B is repeated]

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Minimal delay for P2Y₁₂ interruption

Days after surgery

= Expected average platelet function recovery

1 Decision to stop aspirin throughout surgery should be made on a single case basis taking into account the surgical bleeding risk.

2 In patients not requiring OAC.
Emergency Surgery
OAC Testing

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If the tests are normal, there is no anticoagulant effect.
If the tests for NOACs are abnormal, the impact on haemostasis is uncertain.
VKA Reversal

• Prothrombin complex concentrates

• Vitamin K
Dabigatran Reversal

The New England Journal of Medicine

Original Article

Idarucizumab for Dabigatran Reversal

Charles V. Pollack, Jr., M.D., Paul A. Reilly, Ph.D., John Eikelboom, M.B., B.S., Stephan Glund, Ph.D., Peter Verhamme, M.D., Richard A. Bernstein, M.D., Ph.D., Robert Dubiel, Pharm.D., Menno V. Huisman, M.D., Ph.D., Elaine M. Hylek, M.D., Pieter W. Kamphuisen, M.D., Ph.D., Jörg Kreuzer, M.D., Jerrold H. Levy, M.D., Frank W. Sellke, M.D., Joachim Stangier, Ph.D., Thorsten Steiner, M.D., M.M.E., Bushi Wang, Ph.D., Chak-Wah Kam, M.D., and Jeffrey I. Weitz, M.D.
Andexanet Alfa for Acute Major Bleeding Associated with Factor Xa Inhibitors

Stuart J. Connolly, M.D., Truman J. Milling, Jr., M.D., John W. Eikelboom, M.D., C. Michael Gibson, M.D., John T. Curnutte, M.D., Ph.D., Alex Gold, M.D., Michele D. Bronson, Ph.D., Genmin Lu, Ph.D., Pamela B. Conley, Ph.D., Peter Verhamme, M.D., Ph.D., Jeannot Schmidt, M.D., Saskia Middeldorp, M.D., Alexander T. Cohen, M.D., Jan Beyer-Westendorf, M.D., Pierre Albaladejo, M.D., Jose Lopez-Sendon, M.D., Shelly Goodman, Ph.D., Janet Leeds, Ph.D., Brian L. Wiens, Ph.D., Deborah M. Siegal, M.D., Elena Zotova, Ph.D., Brandi Meeks, B.Eng., Juliet Nakamya, Ph.D., W. Ting Lim, M.Sc., and Mark Crowther, M.D., for the ANNEXA-4 Investigators*
Factor Xa Inhibitor Reversal

- Consider
  - Prothrombin complex concentrates
  - Tranexamic acid
  - Activated factor VII
Antiplatelet Agent Reversal

• Consider
  • Platelet infusion
My Talk Today

• Don’t over estimate the thrombosis risk

• Bleeding is bad

• Bridge very infrequently

• Usually continue aspirin