PROTOCOL FOR MANAGEMENT OF ANTICOAGULATION IN THE PERIOPERATIVE PERIOD: BRIDGING ANTICOAGULATION

The aims of Bridging Anticoagulation in the Perioperative Period are to ensure appropriate patient protection from thromboembolic events whilst minimizing the risk of surgical complications, particularly bleeding.

The current recommendations are based on the requirements of patients at the RHW who comprise a specific perioperative risk group.

- All patients must be assessed at least 7 days before surgery to allow for planning of perioperative anticoagulant management, especially before major surgery.
- Patients must be provided with written instructions outlining the perioperative timing of warfarin and antiplatelet drug discontinuation and resumption, dose and timing of Low Molecular Weight Heparin (LMWH) bridging, and International Normalised Ratio (INR) measurement schedule.
  - This should include patient and caregiver education on injection technique when outpatient LMWH bridging is required.
- INR testing must occur on the day before surgery, where appropriate and feasible, to identify patients with elevated INRs and permit timely use of corrective oral vitamin K thereby avoiding blood product administration or surgery deferral
- Assessment of postoperative hemostasis should occur, preferably on the day of surgery and on the first postoperative day, to facilitate safe resumption of anticoagulant drugs

To determine the appropriate management of patients with a history of thromboembolism or currently taking anticoagulants or antiplatelet agents, the following guide is recommended.

NOTE - FOR PATIENTS ON NEW ANTICOAGULANTS- (DABIGATRIN, RIVAROXABAN, APIXABAN) SEE PROTOCOL 5 BELOW

Ten days pre-operatively, use the following tables to:
1. Assess the risk of thromboembolism: low, moderate, high – or indication for antiplatelet therapy – see Table 1
2. Assess the potential bleeding risk associated with the planned procedure: high/moderate, low, very low – see Table 2
3. Determine the appropriate protocol to follow from Table 3.
4. Institute appropriate protocol.

Table 1
RISK OF THROMBOEMBOLISM
Low –
- Venous thromboembolism (VTE)> 3/12 prior
- Atrial Fibrillation CHADS2 score ≤2 (see below)
- Cardiovascular disease
- Cerebrovascular disease
- Low risk prosthetic heart valve (bioprosthetic, newer model mechanical)
Moderate -
- Arterial or Venous thromboembolism:
  - within 4-12 weeks of proposed surgery
  - recurrent
  - with thrombophilia
- Atrial fibrillation and:
  - CHADS<sub>2</sub> score ≥3 (see below)
  - Valvular heart disease
- All other cardiac valves
- Multiple strokes or transient ischaemic attacks (TIAs)
- Coronary artery stents

High -
- Arterial or venous thromboembolism within 4 weeks of proposed surgery

CHADS<sub>2</sub> score for non-valvular atrial fibrillation

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive heart failure, past or current</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 75 years</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Stroke (ischaemic), transient ischaemic attack</td>
<td>2</td>
</tr>
</tbody>
</table>

Patients on antiplatelet drugs should be assessed regarding the indication for their antiplatelet therapy; either therapeutic or prophylactic:

Therapeutic – Recurrent strokes or TIA’s
- Recent (within 6-12 weeks) myocardial infarction, or coronary artery bypass graft or TIA,
- Bare metal coronary artery stents <12 weeks
- Drug eluting coronary artery stents <12 months
- Atrial fibrillation with CHADS<sub>2</sub> score ≥3
  - see Protocol 4b

Prophylactic - All other indications
  - see Protocol 4a
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Table 2
BLEEDING RISKS OF SURGERY

<table>
<thead>
<tr>
<th>Bleeding Risk</th>
<th>High/Moderate</th>
<th>Low</th>
<th>Very Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/Moderate</td>
<td>Radical pelvic &amp; abdominal surgery, breast surgery</td>
<td>History of bleeding or coagulopathy</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Abdominal wall surgery</td>
<td>Non radical pelvic surgery</td>
<td></td>
</tr>
<tr>
<td>Very low</td>
<td>EUA, cystoscopy, brachytherapy, hysteroscopy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3
BLEEDING RISK

Thromboembolism Risk

<table>
<thead>
<tr>
<th>Bleeding Risk</th>
<th>HIGH/ MODERATE</th>
<th>LOW</th>
<th>VERY LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>3</td>
<td>2</td>
<td>REMAIN ON USUAL TREATMENT</td>
</tr>
<tr>
<td>MODERATE</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ANTIPLATELET</td>
<td>4a or 4b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEW ORAL ANTICOAGULANTS</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

PROTOCOLS

For patients on therapeutic or prophylactic LMWH administer last dose 24 hours pre-operatively and resume as per Protocol 1 or 2 as indicated.

Standard Anticoagulants ie warfarin

**PROTOCOL 1**
- Cease Warfarin 5 days prior ie omit 4 doses
- Check INR one day pre-op
- If INR > 1.5 administer Vitamin K (Phytonenadione) 2mg orally
- Recheck INR on day of surgery
PROTOCOL FOR MANAGEMENT OF ANTICOAGULATION IN THE PERIOPERATIVE PERIOD: BRIDGING ANTICOAGULATION cont’d

Post operatively
- Commence prophylactic LMWH
- Recomence warfarin ASAP (as soon as possible)
- Cease LMWH when INR > 1.8

PROTOCOL 2
- Cease Warfarin 5 days prior & omit 4 doses
- Commence therapeutic LMWH 2 days pre-op
- Administer last dose of LMWH, 24 hours pre-op
- Check INR one day pre op, if > 1.5 administer Vitamin K (Phytoomenadione) 2mg orally
- Recheck INR on day of surgery

Post operatively
- Resume prophylactic LMWH within 24hrs.
- Increase dose to therapeutic LMWH at 24-48 hours
- Recomence warfarin ASAP
- Cease LMWH when INR > 1.8

PROTOCOL 3
- Consider IVC filter if VTE < 4/52 prior to surgery
- Cease Warfarin 5 days prior, ie omit 4 doses
- Admit for IV adjusted dose unfractionated heparin 2 days prior to surgery (as per relevant RHW protocol)
- Maintain therapeutic APTT
- Cease IV heparin 4 hours pre-op

Post operatively (Post-op):
- Resume IV Heparin (without loading dose), at previous therapeutic rate 6-24 hours post op.
- After 24-48 hours, consider change to therapeutic dose LMWH if appropriate and cease unfractionated heparin 4-6 prior to first dose.
- Recomence warfarin ASAP
- Cease LMWH/unfractionated heparin when INR > 2.0

Antiplatelet therapy

PROTOCOL 4a:
- Cease all antiplatelet therapy 7-10 days prior to surgery
  This includes aspirin, clopidogrel, ticlopidine, dipyridamole
PROTOCOL FOR MANAGEMENT OF ANTICOAGULATION IN THE PERIOPERATIVE PERIOD: BRIDGING ANTICOAGULATION  cont’d

PROTOCOL 4b:
- Continue aspirin but cease all other antiplatelet agents 10 days prior to surgery ie clopidogrel, ticlopidine, dipyridamole
- Patients receiving clopidogrel ± aspirin following insertion of a drug-eluting coronary artery stent are at increased risk of stent occlusion in the first 6-12 months following insertion. In these patients, clopidogrel should be ceased 10 days pre-op but aspirin continued.
  Consider the addition of prophylactic LMWH

New anticoagulants ie dabigatrin, rivaroxaban, apixaban

PROTOCOL 5:
Semi-acute or elective surgery
- Assess the risk of bleeding against the risk of thrombosis as these agents may not need to be discontinued for minor procedures.
- Consider bridging anticoagulant therapy only if there is a high risk of thrombosis (see Table 3).
- In situations where complete haemostasis is required, activated partial thromboplastin time (APTT) and thrombin time (TT) should be checked pre-operatively.
- Dabigatrin is primarily renally excreted (80%) while rivaroxaban and apixaban are less dependent on renal clearance (25-33%).
- The timing of discontinuation should be based on the following chart:

<table>
<thead>
<tr>
<th>Renal function (CrCl ml/min)</th>
<th>Timing of discontinuation before surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard risk of bleeding</td>
</tr>
<tr>
<td>&gt; 80</td>
<td>24</td>
</tr>
<tr>
<td>&gt; 50 to ≤ 80</td>
<td>24</td>
</tr>
<tr>
<td>&gt; 30 to ≤ 50</td>
<td>At least 2 days (48 hours)</td>
</tr>
<tr>
<td>≤ 30</td>
<td>2-5 days</td>
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</tbody>
</table>

Emergency surgery

Accurate testing of the anticoagulant effect of these new agents is difficult. The standard tests of APTT and prothrombin time indicate, with sufficient probability for most situations encountered, that the drug is present at a very low residual concentration ensuring that emergency surgery can be performed without further delay and without a significant increase in bleeding risk.

Note that INR is not an indicator of bleeding risk in this setting.
PROTOCOL FOR MANAGEMENT OF ANTICOAGULATION IN THE PERIOPERATIVE PERIOD: BRIDGING ANTICOAGULATION  cont’d

Consider delaying surgery if appropriate until sufficient time has elapsed for drug clearance (see above).

Where urgent life-saving surgery cannot be delayed, consult with Haematology re measures to control bleeding prior to and during the surgery eg recombinant factor VIIa.

Precautions:
LMWH
- Modify dose in patients with renal impairment
- Monitor anti Xa levels in patients with renal insufficiency, weight >150kg.
- Care in patients with history of bleeding disorder, intracranial haemorrhage, GIT bleeding, recent trauma or surgery, severe liver disease
- Avoid in patients with past history of heparin induced thrombocytopenia (HITS) associated with previous exposure to LMWH

Materials
Educate patient in technique of subcutaneous injection if appropriate.

Prophylactic LMWH:
Enoxaparin 20-40mg by subcutaneous injection daily
Dalteparin 2500-5000 units by subcutaneous injection daily
As per RHW protocol LMWH

Therapeutic LMWH
Enoxaparin 1mg/kg by subcutaneous injection twice daily
Dalteparin 100 units/kg by subcutaneous injection twice daily
As per RHW protocol LMWH

Related Protocols
- LMWH
- LMWH and Regional Anaesthesia
- Warfarin

References

REVISION & APPROVAL HISTORY
Reviewed and endorsed Therapeutic & Drug Utilisation Committee 8/4/14
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Approved Patient Care Committee 18/1/04

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