Orthogeriatrics—Clinical Summary Document

Antithrombotic therapy

Topics
- Preexisting anticoagulation and timing of surgery
- Reversal of anticoagulation
- Perioperative thromboprophylaxis
- When should we be cautious?

Why should surgeons be interested in anticoagulation?
- Aging population: more anticoagulated patients requiring surgery
- Preexisting anticoagulation has an influence on:
  - Timing of surgery
  - Intraoperative and postoperative bleeding risk
  - Patient’s risk of perioperative thromboembolic events

Antithrombotic agents

Antiplatelet drugs
- Acetylsalicylic acid (Aspirin®)
- Thienopyridines: clopidogrel (Plavix®) or ticlopidine (Ticlid®)

Anticoagulants
- Vitamin K antagonists (VKAs): coumarins (eg, Warfarin®, Marcumar®, Sintrom®)
- Unfractionated heparin (UFH)
- Low-molecular-weight heparins (LMWH) – eg, enoxaparin (Lovenox®)
- Synthetic Factor Xa inhibitor: fondaparinux (Arixtra®)

Medical indications

**Anti-platelets** are indicated in coronary artery, peripheral, and cerebrovascular disease. Furthermore, they are indicated after coronary artery stenting or bypass grafting.

**Anticoagulants** are indicated in atrial fibrillation (aFib), after mechanical heart valve (MHV) replacement, treatment of deep venous thrombosis (DVT), pulmonary embolism (PE), as well as perioperative thromboprophylaxis.

"New oral anticoagulants"
Rivaroxaban or Xarelto® (oral factor Xa-inhibitor) and Dabigatran or Pradaxa® (oral direct thrombin inhibitor)
- Approved for thromboprophylaxis after knee or hip replacement and for anticoagulation in atrial fibrillation
- Contraindicated in severe renal impairment
- Do not need anticoagulation monitoring
- No specific antidote
- More expensive, with no therapeutic advantages over Warfarin®, but better comfort
Timing of Surgery

**Timing of Surgery**

![Diagram showing timing of surgery for selected medications](image)

Note: Prothrombin complex concentrates are now licensed for urgent reversal of warfarin and are preferable in a number of situations.

**Reversal of vitamin K antagonists**

- **Full elective surgery:**
  - Stop VKAs 4–5 days before surgery to allow the international normalized ratio (INR) to fall to a subtherapeutic (1.5–2.0) or normal (1.0–1.5) level

- **Semi-urgent surgery:**
  - More rapid reversal over 1 or 2 days
  - Stop VKAs and give low dose vitamin K (1–3 mg) orally or intravenously

- **Urgent surgery:**
  - Reversal within < 1 day
  - Stop VKAs, give 2.5–5 mg vitamin K slowly and intravenously
  - check INR after 4 hours, give fresh frozen plasma (FFP) if necessary
Consider prothrombin complex concentrate (in consultation with hematologist) for patient with acute major bleeding

Can we just stop anticoagulation therapy?

Basic questions:
- What is the clinical indication for anticoagulation?
- What is the individual risk for thromboembolism if anticoagulation is stopped or reduced?
- What are the clinical consequences of a thromboembolic event?
- What is the patient's risk for bleeding?

Bridging therapy:
- Means: covering the time of subtherapeutic INR after cessation of vitamin K antagonists by administering heparin in patients at risk for thromboembolic events
  - Mechanical heart valve replacement
  - Atrial fibrillation
  - Venous thromboembolism
- Weigh risk for thromboembolism against bleeding risk
- Consult a specialist (cardiologist) in unclear cases

Perioperative bridging therapy with a therapeutic-dose subcutaneous LMWH or intravenous UFH is recommended in patients with a mechanical heart valve, atrial fibrillation, or venous thromboembolism (VTE) at high or moderate risk for thromboembolism, as estimated by the CHADS<sub>2</sub> score. Postoperatively, consider the bleeding risk and adequacy of hemostasis in the individual patient to determine the timing to resume anticoagulation therapy.

Regimens:
- Therapeutic dose LMWH, eg, enoxaparin 1 mg/kg subcutaneous twice daily up to 24 hours before surgery
- Therapeutic dose UFH: continuous intravenous infusion regulated to activated partial thromboplastin time (aPTT) up to 4 hours before surgery
- Low dose (prophylactic) LMWH, eg, enoxaparin 40 mg subcutaneous once daily up to 12 hours before surgery [1]

Special case: dual antiplatelet therapy after coronary stenting:
- Dual antiplatelet therapy consists of Aspirin® and Plavix® for 12 months after drug-eluting stents (DES) for at least 3 months after bare metal stents (BMS).
- Early discontinuation increases risk for stent thrombosis is about 90 folds.
- Mortality of stent thrombosis is 30–70%.
- Always consult the cardiologist: interdisciplinary decision.
- In emergency cases, keep Aspirin® and stop Plavix®.
- Do not carry out elective surgery in patients with drug-eluting stents within the first 12 months.

Perioperative thromboprophylaxis
- VTE is one of the leading causes of perioperative mortality in geriatric fracture patients.
- Fatal pulmonary embolism occurs in up to 7.5% of hip fracture patients within 3 months.
High risk associated with orthopedic or trauma surgery includes venous stasis (immobilization), supine position on operating table, intimal injury, and release of tissue factors by fracture or surgery.

A routine aspect in the care of the geriatric fracture patient.

**Thromboprophylactic agents**

The following agents are recommended:

- Low dose LMWH, eg, enoxaparin: 40 mg subcutaneous once or 30 mg subcutaneous twice daily
- Fondaparinux: 2.5 mg subcutaneous once daily
- New oral anticoagulants in elective knee and hip replacement
- Vitamin K antagonists dosed to a target value of INR 2.5
- Low-dose UFH 5000 IU subcutaneous twice daily

Remark: Graduated compression stockings are not recommended any more for geriatric fracture patients who can be treated with anticoagulants.

**Recommended reading:**

Disclaimer

Production: AO Foundation, Switzerland

Hazards
Great care has been taken to maintain the accuracy of the information contained in this publication. However, the publisher, and/or the distributor, and/or the editors, and/or the authors cannot be held responsible for errors or any consequences arising from the use of the information contained in this publication. Contributions published under the name of individual authors are statements and opinions solely of said authors and not of the publisher, and/or the distributor, and/or the AO Group.

The products, procedures, and therapies described in this work are hazardous and are therefore only to be applied by certified and trained medical professionals in environments specially designed for such procedures. No suggested test or procedure should be carried out unless, in the user’s professional judgment, its risk is justified.

Whoever applies products, procedures, and therapies shown or described in this work will do this at their own risk. Because of rapid advances in the medical sciences, AO recommends that independent verification of diagnosis, therapies, drugs, dosages, and operation methods should be made before any action is taken.

Although all advertising material which may be inserted into the work is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement by the publisher regarding quality or value of such product or of the claims made of it by its manufacturer.

Legal restrictions
This work was produced by AO Foundation, Switzerland. All rights reserved. This publication, including all parts thereof, is legally protected by copyright. Any use, exploitation or commercialization outside the narrow limits set forth by copyright legislation and the restrictions on use laid out below, without the publisher’s consent, is illegal and liable to prosecution.

This applies in particular to photostat reproduction, copying, scanning or duplication of any kind, translation, preparation of microfilms, electronic data processing, and storage such as making this publication available on Intranet or Internet.

Some of the products, names, instruments, treatments, logos, designs, etc. referred to in this publication are also protected by patents and trademarks or by other intellectual property protection laws (e.g. “AO”, “ASIF”, “AO/ASIF”, TRIANGLE/GLOBE Logo” are registered trademarks) even though specific reference to this fact is not always made in the text. Therefore, the appearance of a name, instrument, etc. without designation as proprietary is not to be construed as a representation by the publisher that it is in the public domain.

Restrictions on use: The rightful owner of an authorized copy of this work may use it for educational and research purposes only. Single images or illustrations may be copied for research or educational purposes only. The images or illustrations may not be altered in any way and need to carry the following statement of origin “Copyright by AO Foundation, Switzerland”.

Copyright © 2014 by AO Foundation, Switzerland, Clavadelerstrasse 8, CH-7270 Davos Platz

Provided by Tobias Roth, Medical University of Innsbruck, Innsbruck, Austria (January 2014)