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Prepared by: Hanny Tan, M.D.
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Perioperative Management of Chronic Anticoagulation

Key Points:

1. The final decision to withhold or continue anticoagulation should be individualized and at the best interest of the patient, taking primarily into account the indication for anticoagulation, risk of thromboembolism off anticoagulation, risk of bleed, and type/duration of the procedure.
2. For patients with very high or high thrombosis risk use heparin bridging with either unfractionated or low molecular weight heparin prior to invasive procedures and major surgery.
3. For low risk procedures, such as dental procedures, joint/soft tissue injections and arthrocentesis, cataract surgery, and upper and lower gastrointestinal endoscopy, oral anticoagulation therapy DOES NOT need to be withheld.
4. For urgent procedures can use low dose oral or subcutaneous vitamin K to reduce INR within 24-36 hours; if an emergency, use fresh frozen plasma or prothrombin complex concentrate.
5. There are no prospective clinical trials.

Assessing Patient Specific Risks

The issue of anticoagulation and procedures is always a challenge. As physicians, we often err on the side of safety. The keys to assessing a patient risk include (1) determining the indication for anticoagulation and thus the thromboembolic risk off anticoagulation risk of bleeding, and (2) understanding the patient's risk of bleeding.

Patient's risk of thromboembolism[1,2]:

- **Low** (annual risk <4% thromboembolic stroke without anticoagulation)
  - Non-valvular atrial fibrillation without thromboembolic stroke or intermediate factors (listed below)
  - DVT ≥ 3 months **without** high risk features (recurrent thromboembolism, malignancy, hypercoaguable states, extremity paresis)
  - Cardiomyopathy without atrial fibrillation

- **Intermediate** (annual risk 4-7% thromboembolic stroke without anticoagulation)
  - Mechanical **aortic** valves in sinus rhythm (see NOTE[2])
  - Atrial fibrillation with the following risks: age >65 y/o without high risk features OR <65 y/o with DM, CAD, HTN, PVD[9]
  - DVT ≤ 3 months **without** high risk features
  - Mitral stenosis, CAD, LV aneurysm, CHF with LV dilitation

- **High** (annual risk >7% thromboembolic stroke without anticoagulation)
  - Mechanical **mitral** valves (see NOTE[2])
  - **Aortic** mechanical heart valve with prior thromboembolism, atrial fibrillation, heart failure (see NOTE[2])
  - DVT >3 months **with** high risk features

- Atrial fibrillation with the following risks: history of thromboembolic stroke/TIA, heart failure, LV dysfunction, mitral stenosis, prosthetic heart valves, thyroid disease, >75 y/o with DM, HTN.[9]
- Hypercoaguable states
    1. Factor V Leiden
    2. Prothrombin gene mutation
    3. Antiphospholipid antibody
    4. Anticardiolipin antibodies
    5. Protein C& S deficiency
    6. Antithrombin III deficiency

- **Very High**
    - Multiple heart valves, bileaflet mitral heart valve with atrial fibrillation, heart failure, or prior embolus
    - DVT within 1 month with high risk features

NOTE[1]: The highest risk of recurrence for DVT is within the first 1-3 months after the acute episode. With anticoagulation therapy, the risk of recurrence is 17% at 1 week, 13% at 1 month, 3% at 3 months, and 2% at 6 months/1 year, 1% at 2 years, 0.5% 10 years. Without anticoagulation therapy, the risk of recurrence is 40% at 1 month and 10% at 2 months. Independent risk factors will increase a patient's risk of recurrence.[6]

NOTE[2]: Caged-ball valves (Starr Edwards) and tilting disc valves (Bjork Shiley) are higher risk of thrombosis than bileaflet valves (St. Jude's).

Patient's Risk of Bleeding: [6]

- Take a patient's bleeding history
    - Epistaxis
    - Hematochezia
    - Melena
    - Hemoptysis
    - Hemarthrosis
    - Petechiae/ecchymosis/purpura
    - Hematuria
    - Menorrhagia
    - History of bleeding or requirement of transfusions in prior procedures
    - Consider acquired coagulopathies in renal failure, liver failure, malignancies, myeloproliferative disorders, dysproteinemias

Assessing Procedure Specific Risk

Considerations:[1,2,6]

- How urgent is the procedure?
- How invasive is the procedure?
- Location of the surgery?
- Duration of the surgery?
- Can the area of bleeding be compressed or easily controlled if bleeding?

- Duration of bleeding risk after surgery?
- What are the consequences of bleeding intra- and post-operatively?

Bleeding Risk:[1,2,6]

- **Low**
  - Dental
  - Ophthalmic, except major lid and orbital surgery
  - Endoscopy
  - Prostate surgery (transuretheral laser ablation, TURP)
  - Cutaneous surgery
  - Joint/soft tissue injection
- **Intermediate**
  - Endoscopy with polypectomy, sphincterotomy (can get delayed bleeding)
  - Laproscopic surgery
  - Open cholecystectomy
- **High**
  - Major abdominal surgery
  - Neurosurgical procedures

Risk Reduction

Low Bleed Risk from Surgery[1,2,6]

- Continue warfarin through surgery with an INR of 1.3-1.5 (lower limit of therapeutic)
- Warfarin dose can be lowered 4-5 days before the procedure and resumed at full dose after surgery
- Post-operative subcutaneous UFH (unfractionated heparin) or LMWH (low molecular weight heparin) as needed

Moderate to High Risk of Bleed from Surgery[1,2,6]

Risk of Thrombosis	**Low (annual risk < 4%)**	**Intermediate (annual risk 4-7%)**	**High (annual risk >7%)**	**Very High**
Guidelines	• Stop warfarin 4 days prior to surgery • Use prophylactic doses of UFH or LMWH sc when surgery increases risk of thrombus • Resume warfarin on day of surgery	• Stop warfarin 4 days prior to surgery • Optional use of therapeutic dose sc LMWH pre- and post-operative • Post-operative doses of sc UFH or LMWH (if therapeutic doses not used) • Resume warfarin on day of surgery	• Stop warfarin 4 days prior to surgery • Therapeutic dose sc Discontinue LMWH 12-24 hours before surgery • Resume therapeutic doses of heparin post-operatively • Resume warfarin on day of surgery • LMWH pre- and post-operative	• Stop warfarin 4 days prior to surgery • Therapeutic dose sc LMWH pre- and post-operative • Discontinue UFH 12 hours before surgery • Resume therapeutic doses of IV UFH 12 hours post-operatively • Resume warfarin on day of surgery

Urgent Surgery/Active Bleed

To reverse the effects of chronic anticoagulation with warfarin[6]:

- Fresh frozen plasma
  - Weight based (based on estimating plasma volume, the patient's body weight in kg, and targeted increase in coagulant factor)
  - Average individual usually requires 6-7 units FFP for reversal
- Concomitant Vitamin K[6]
  - Vitamin K intravenously 1.5 mg or 2.5 mg orally will likely reverse therapeutic INRs within 24-36 hours
  - Caution with intravenous vitamin K as it sometimes causes anaphylaxis
  - Avoid intramuscular vitamin K for risk of intramuscular bleeding
  - Avoid higher doses of vitamin K secondary to prolonged time to achieve therapeutic INRs after completion of the procedure.

References

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