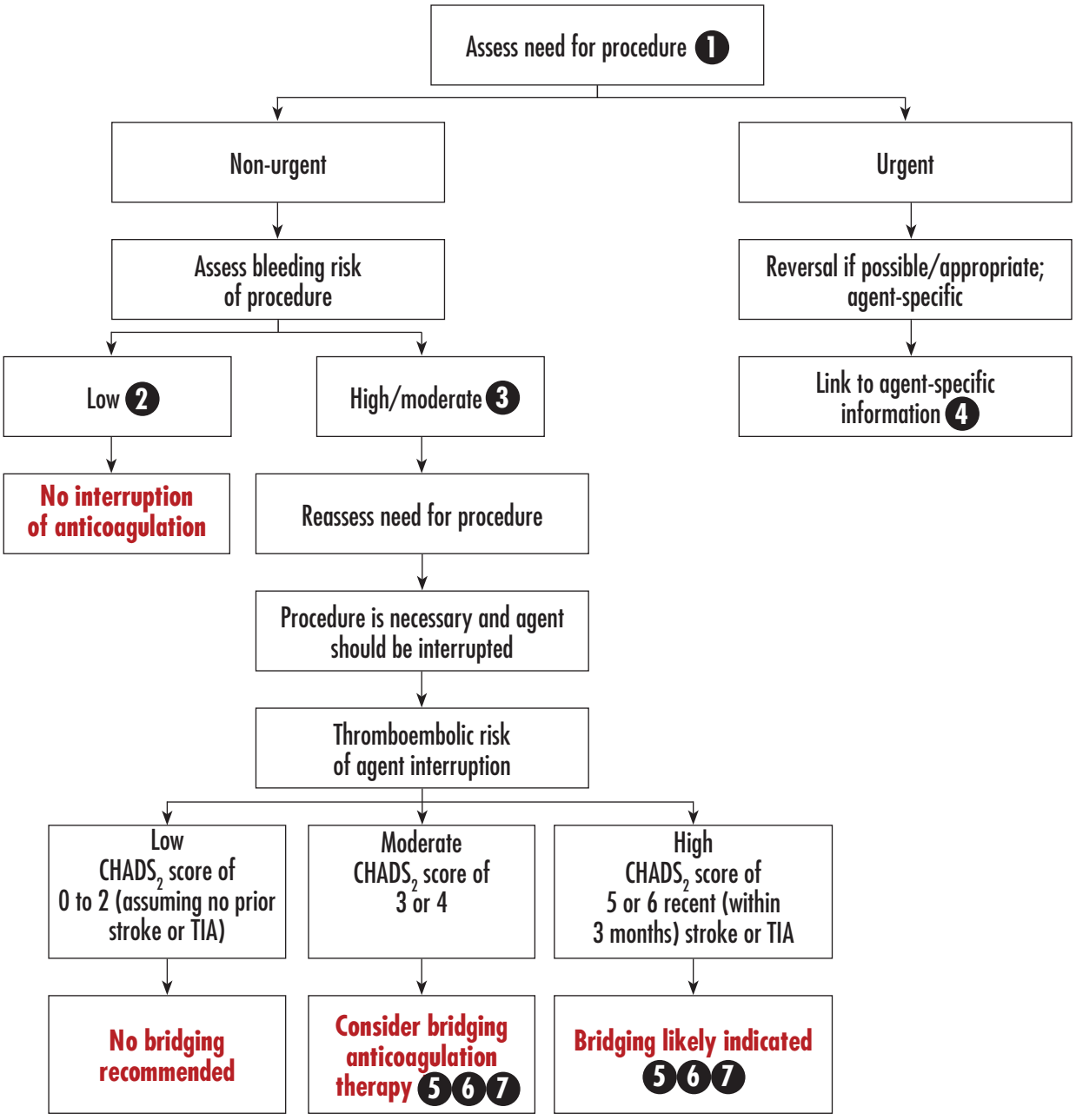
TEAM-A
The Evolution of Anticoagulation Management Atrial Fibrillation

MANAGING PERIPROCEDURAL ANTICOAGULATION IN NONVALVULAR ATRIAL FIBRILLATION



1. When assessing the need for procedure and interruption of anticoagulation, one must consider the risk/benefit ratio of the procedure, the risk of increased periprocedural bleeding, and the risk of thromboembolism while the patient is off anticoagulation. In the end, all decisions should be the result of an informed discussion between the patient and the healthcare providers performing the procedure and managing the anticoagulation. Close follow-up for all patients is indicated.

2. Low-risk procedures include, in particular, minor dental and dermatologic procedures.

3. Moderate and high bleeding risk surgeries include, but are not limited to (Douketis et al, 2012, p.e331S):
   a. Urologic surgery and procedures consisting of transurethral prostate resection, bladder resection, or tumor ablation; nephrectomy; or kidney biopsy in part due to untreated tissue damage (after prostatectomy) and endogenous urokinase release.
   b. Pacemaker or implantable cardioverter defibrillator device implantation in which separation of infraclavicular fascial layers and lack of suturing of unopposed tissues within the device pocket may predispose to hematoma development; recent studies suggest that performing such a procedure without interruption of warfarin anticoagulation results in fewer bleeding complications than does use of bridging heparin products (Birnie et al, 2013).
   c. Colonic polyp resection, typically of large (ie, 1-2 cm long) sessile polyps, in which bleeding may occur at the transected stalk following hemostatic plug release.
   d. Surgery and procedures in highly vascular organs, such as the kidney, liver, and spleen.
   e. Bowel resection in which bleeding may occur at the bowel anastomosis site.
   f. Major surgery with extensive tissue injury (eg, cancer surgery, joint arthroplasty, reconstructive plastic surgery).
   g. Cardiac, intracranial, or spinal surgery, especially as small pericardial, intracerebral, or epidural bleeds can have serious clinical consequences.

4. Agent-specific management and reversal information:
   a. Patients should have a recent assessment of weight, renal function, hemoglobin, platelet count, and coagulability.
   b. Vitamin K antagonist: hold 5-7 days preoperatively, depending on the procedure/operator needs; may be reversed with vitamin K (maximal effect 24-48 hours after dose) or with FFP in an urgent situation.
   c. Dabigatran: according to package insert, discontinue 1-2 days (if CrCl >50mL/min) or 3-5 days (if CrCl <50mL/min) prior to invasive or surgical procedures; consider longer times for patients undergoing major surgery, lumbar puncture, or spinal or epidural catheter or port placement, in whom complete hemostasis may be required; agent not reversible; in an emergency it may be dialyzed off; there may be some benefit with prothrombin complex concentrate recombinant factor VIIa, but this is unclear.
   d. Rivaroxaban: hold at least 24 hours prior to the procedure; consider 48 hours in patients with CrCl <50 mL/min; agent is not reversible; there may be some benefit with prothrombin complex concentrate recombinant factor VIIa, but this is unclear.
   e. Apixaban: according to package insert, discontinue at least 48 hours prior to elective surgery or invasive procedures with a moderate or high risk of unacceptable or clinically significant bleeding; discontinue at least 24 hours prior to elective surgery or invasive procedures with a low risk of bleeding or where the bleeding would be noncritical in location and easily controlled; an increased rate of stroke was observed following discontinuation of apixaban in clinical trials in patients with nonvalvular atrial fibrillation; if apixaban is discontinued for a reason other than pathological bleeding, coverage with another anticoagulant should be strongly considered.
   f. Antiplatelet agents
      i. Aspirin, if held, should be stopped 7-10 days prior to surgery, if possible.
      ii. Clopidogrel and prasugrel, if held, should be stopped 5-7 days prior to surgery.
      iii. The above recommendations apply for antiplatelet agents used for cerebrovascular accident prophylaxis in non-valvular atrial fibrillation, not specifically for cardiac stents, coronary artery disease, etc.
   g. Heparin: the CHEST 2012 guidelines recommend holding UFH 4-6 hours preoperatively, a grade 2c recommendation.
   h. Low-Molecular Weight Heparin (LMWH): hold for 24 hours preoperatively.

5. There are no clearly validated tools that allow assessment of periprocedural thrombotic risk. A $CHADS_2$ score can approximate risk, but the periprocedural period is associated with higher risk for thrombosis in general due to factors including the $CHADS_2$ risks, immobility, inflammation, active malignancy/ history of malignancy, and vascular damage.

6. Common bridging medications and issues:
   a. Many patients with nonvalvular atrial fibrillation do not require perioperative bridging anticoagulation. Please note that these recommendations apply ONLY to patients with nonvalvular atrial fibrillation; patients with a history of venous thromboembolism, mechanical heart valve, or other indications for anticoagulation are at higher risk and should be approached in a different manner.
   b. Agents such as rivaroxaban and dabigatran can be held periprocedurally and resumed shortly thereafter (refer to package insert); a traditional heparin-based "bridge" is not necessary. Cessation of apixaban is associated with increased thrombotic risk in the short term, so bridging should be considered.
   c. Therapeutic LMWH dosing is perhaps the most commonly employed agent and provides a balance between convenience and thromboembolic prevention.
   d. Therapeutic unfractionated heparin is well studied and generally safe, particularly in renal failure, but requires hospital admission and an IV infusion.
   e. Low-dose (prophylactic UFH or LMWH) as bridging therapy is not well studied, but may provide some benefit at the cost of some efficacy.
   f. The last dose of therapeutic LMWH should be administered about 24 hours preprocedurally.
   g. Unfractionated heparin may be stopped 4-6 hours prior to the procedure.

7. Resumption of anticoagulation: depends on the agent involved and the procedure performed and should be coordinated with the surgeon depending upon the bleeding risk of the procedure.
   a. Rivaroxaban, dabigatran, and apixaban provide therapeutic anticoagulation as soon as they are resumed, so no further bridging agent is necessary.
   b. Heparin provides immediate anticoagulation; resumption timing is based on indication and bleeding risk associated with the procedure.
   c. LMWH provides immediate anticoagulation; resume 24 hours. postoperatively after a low-risk procedure and 48-72 hours after a high bleeding risk procedure (CHEST 2012 guidelines, grade 2c).
   d. Vitamin K antagonists may be resumed 12-24 hrs postprocedurally; there is typically a several-day lag between resumption and anticoagulation effect.

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Additional References

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