Practice Guidelines

Perioperative Management of Antithrombotic Medications: Guidelines From the American College of Chest Physicians

Key Points for Practice

- Perioperative antithrombotic management depends on balancing bleeding risk with risk for thrombosis; for surgeries with minimal bleeding risk, continue antithrombotic treatment.
- Because of their rapid onset and degradation, most direct oral anticoagulants can be stopped one to two days before a procedure and restarted one to two days after the procedure in patients without significant chronic kidney disease.
- Bridging with heparin for patients taking warfarin is reserved for those at high risk of thromboembolism in most cases.
- Aspirin can be continued through most surgeries.

From the *AFP* Editors

Up to 20% of patients taking antithrombotic medications will need an invasive procedure. The American College of Chest Physicians published updated guidelines on perioperative management of antithrombotic medications for elective procedures based on a systematic review of primarily low-quality evidence.

Balance of Risks

The risk of bleeding following a procedure and the risk of thromboembolism from the initial need for antithrombotic treatment are the two factors used to determine whether and how long to hold medications. *Table 1* stratifies common surgeries by bleeding risk. For procedures with minimal bleeding risk, the antithrombotic medication can generally be continued. For low- to moderate- or high-bleeding risk, most medications are stopped before surgery and later restarted. Patient or surgical factors may increase bleeding risk.

Knowing the risk for thrombosis is important if medications are held, especially when antithrombotic medications are held for longer periods of time. Because direct oral anticoagulants are held for a short period of time, bridging with heparin is generally not recommended. The American College of Chest Physicians suggests heparin bridging for high thrombotic risk conditions if the patient is taking a vitamin K antagonist *(Table 2)*.

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This series is coordinated by Michael J. Arnold, MD, assistant medical editor.

A collection of Practice Guidelines published in *AFP* is available at https://www.aafp.org/afp/practguide.

CME This clinical content conforms to AAFP criteria for CME. See CME Quiz on page 126.

Author disclosure: No relevant financial relationships.

G-TRUST GUIDELINE SCORECARD

Score	Criteria
Yes	Focus on patient-oriented outcomes
Yes	Clear and actionable recommendations
Yes	Relevant patient populations and conditions
Yes	Based on systematic review
Yes	Evidence graded by quality
Yes	Separate evidence review or analyst in guideline team
Cannot tell	Chair and majority free of conflicts of interest (both chairs report significant conflicts of interest but recusal from the pharmaceutical companies as of 2021; both recused from voting)
Cannot tell	Development group includes most relevant specialties, patients, and payers (mix of specialties, apparently no patient input)
	Overall – useful

Note: See related editorial, Where Clinical Practice Guidelines Go Wrong, at https://www.aafp.org/afp/gtrust.html.

G-TRUST = guideline trustworthiness, relevance, and utility scoring tool.

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TABLE 1

Bleeding Risk for Surgical Procedures

High risk	Low to moderate risk	Minimal risk
Any operation that lasts more than 45 minutes	Abdominal hernia repair	Cataract surgery
Cardiac surgery	Abdominal hysterectomy	Minor dental procedures
Gastrointestinal surgeries	Arthroscopy	Minor dermatologic procedures
Intracranial and spinal surgery	Bronchoscopy	Pacemaker or cardioverter-defibrillator device implantation
Kidney biopsy	Colonoscopy	
Major orthopedic surgery	Coronary angiography	
Major thoracic surgery	Gastrointestinal endoscopy	
Most cancer surgeries	Hemorrhoidal surgery	
Most urologic surgeries	Laparoscopic cholecystectomy	
Neuraxial anesthesia and epidural injections	Lymph node biopsy	

Adapted with permission from Douketis JD, Spyropoulos AC, Murad MH, et al. Perioperative management of antithrombotic therapy: an American College of Chest Physicians clinical practice guideline. Chest. *2022;162(5):e213.*

TABLE 2

Indications for Bridging When Holding Vitamin K Antagonists

Risk level	Mechanical heart valve	Atrial fibrillation	Venous thromboembolism
High thrombotic risk (e.g., > 10% per year risk of arterial thromboembolism or > 10% per month risk of venous thromboembolism)	Any mechanical mitral valve Caged ball or tilting-disc aortic valve Stroke or transient ischemic attack in past three months	CHA_2DS_2VASc score ≥ 7 $CHADS_2$ score of 5 or 6 Stroke or transient ischemic attack in past three months Rheumatic valvular heart disease	Venous thromboembolism in past three months Severe thrombophilia: protein C, protein S, or antithrombin deficiency or antiphospholipid antibody syndrome Multiple thrombophilias Active cancer associated with high venous thromboembolism risk

CHA_2DS_2VASc = congestive heart failure, hypertension, age 75 years or older, diabetes mellitus, prior stroke or transient ischemic attack, vascular disease history, age 65 years or older, female sex; $CHADS_2$ = congestive heart failure, hypertension, age 75 years or older, diabetes, prior stroke or transient ischemic attack.

TABLE 3

Antithrombotic Medication Hold Time Based on Bleeding Risk for Procedures

Bleeding risk	Direct oral anticoagulant	Vitamin K antagonist	Antiplatelet
High	Hold for 48 hours before surgery Hold dabigatran (Pradaxa) for four days if glomerular filtration rate < 50 mL per min per 1.73 m^2 (0.83 mL per s per m^2) Consider increasing hold time for severely impaired renal function, impaired hepatic function, or if taking medications that inhibit CYP 3A4	Hold for five days before surgery Bridge with heparin if thrombotic risk is high	Hold clopidogrel for five days before surgery Hold ticagrelor (Brilinta) for three to five days before surgery Hold prasugrel (Effient) for seven to 10 days before surgery Continuing aspirin is recommended; hold for seven days or less if holding
Low to moderate	Hold for 24 hours before surgery Hold dabigatran for three days if glomerular filtration rate < 50 mL per min per 1.73 m^2 Consider increasing hold time for severely impaired renal function, impaired hepatic function, or if taking medications that inhibit CYP 3A4	Hold for five days before surgery Bridge with heparin if thrombotic risk is high	
Minimal	Continue medication	Continue medication	Continue medication

Management of Direct Oral Anticoagulant Medications

For procedures with minimal bleeding risk, direct oral anticoagulants can be continued. Because of their rapid onset and degradation, most direct oral anticoagulants can be stopped one to two days before a procedure and restarted one to two days after the procedure in patients without significant chronic kidney disease. If bleeding risk is higher than minimal (i.e., low to moderate or high) and glomerular filtration rate is 50 mL per min per 1.73 m^2 (0.83 mL per s per m^2) or greater, stop all direct oral anticoagulants one to two days before surgery *(Tables 3 and 4)*. When the

TABLE 4

Timing for Perioperative Management of Antithrombotic Medications

	Medication			
		Antiplatelets		
Day(s) before or after surgery	Direct oral anticoagulants	$P2Y_{12}$ inhibitors	Aspirin	Vitamin K antagonists*
−7 to −10	NA	Stop prasugrel (Effient)	Continuing aspirin through surgery is recommended, otherwise stop at < 7 days prior	NA
−5	NA	Stop clopidogrel		Stop vitamin K antagonist
−4	Stop dabigatran (Pradaxa) if bleeding risk is high and if glomerular filtration rate < 50 mL per min per 1.73 m^2 (0.83 mL per s per m^2)	Stop ticagrelor (Brilinta; 3 to 5 days)		No warfarin
−3	Stop dabigatran if bleeding risk is low or moderate and glomerular filtration rate is < 50 mL per min per 1.73 m^2	Stop ticagrelor; 3 to 5 days)		Start low-molecular-weight heparin bridging if necessary No warfarin
−2	Stop direct oral anticoagulant if high bleeding risk and normal glomerular filtration rate	No prasugrel, clopidogrel, ticagrelor		Continue low-molecular-weight heparin No warfarin
−1	Stop direct oral anticoagulant if low or moderate bleeding risk and normal glomerular filtration rate	No prasugrel, clopidogrel, ticagrelor		If bridging, give half the daily dosage of low-molecular-weight heparin 24 hours before surgery, then stop low-molecular-weight heparin No warfarin
Surgery	No direct oral anticoagulants	No prasugrel, clopidogrel, ticagrelor		No low-molecular-weight heparin No warfarin
+1	Restart direct oral anticoagulant if low or moderate bleeding risk	Restart all		Restart vitamin K antagonist
+2	Restart direct oral anticoagulant if high bleeding risk	NA		Restart low-molecular-weight heparin bridging for low- to moderate-risk bleeding until international normalized ratio at goal
+3	NA	NA		Restart low-molecular-weight heparin bridging for high bleeding risk until international normalized ratio at goal

NA = not applicable.

*—If bleeding risk is minimal, warfarin, direct oral anticoagulants, and antiplatelets can be continued.

glomerular filtration rate is less than 50 mL per min per 1.73 m^2, stop dabigatran (Pradaxa) four days before surgery for high bleeding risk and three days before surgery for low to moderate bleeding risk.

Direct oral anticoagulants can be restarted 24 hours after surgery unless the surgical bleeding risk is high. For a surgery with high bleeding risk, delay restarting the medication for 48 to 72 hours. Because direct oral anticoagulants have a rapid onset, excessive bleeding may occur if they are started too early. After surgery, the bleeding risk must again be balanced against the thrombosis risk. If anticoagulation is delayed, low-molecular-weight heparin for venous thromboembolism prophylaxis after surgery is still recommended.

Management of Vitamin K Antagonist Medications

For patients taking the vitamin K antagonist warfarin, continue the medication if bleeding risk is minimal. With low to moderate or high bleeding risk, stop warfarin; patients with high thrombosis risk should receive heparin before and after surgery. In patients who are at low to moderate risk for thromboembolism, no bridging with heparin is recommended. For atrial fibrillation, the benefits of bridging are less certain because the stroke risk over a few days is low.

Warfarin should be stopped at least five days before the procedure and restarted 12 to 24 hours after the procedure if hemostasis has been obtained *(Table 4)*.

Heparin bridging can occur with unfractionated heparin or low-molecular-weight heparin. If intravenous unfractionated heparin is used, heparin should be stopped at least four hours before the procedure and restarted at least 24 hours after the procedure. If low-molecular-weight heparin is used, give one-half the daily dosage 24 hours before the procedure, and wait at least 24 hours after surgery to give the first postoperative dose of low-molecular-weight heparin. If the surgery has a high bleeding risk, wait 48 to 72 hours before restarting heparin to ensure hemostasis.

Management of Antiplatelet Medications

Continuing aspirin is recommended for all noncardiac surgery. If stopping aspirin, the American College of Chest Physicians recommends stopping within seven days of surgery.

$P2Y_{12}$ platelet receptor inhibitors should be stopped before surgery *(Tables 3 and 4)*. Stop clopidogrel five days before surgery, ticagrelor (Brilinta) three to five days before surgery, and prasugrel (Effient) seven to 10 days before surgery. All $P2Y_{12}$ inhibitors can be restarted within 24 hours of surgery if hemostasis has been obtained.

For dual-antiplatelet therapy post stent placement, management depends on the time since stent placement. If the patient is within 12 weeks postcoronary stenting, either delaying elective surgery or continuing both medications is recommended because of the high risk of stent thrombosis. For patients who are more than three months after coronary stent placement, the recommendation is to stop the $P2Y_{12}$ inhibitor and continue aspirin therapy. Bridging these gaps with antiplatelet or anticoagulant medications does not improve outcomes.

Editor's Note: This is the first update to these guidelines for management of antithrombotic medications since 2012, when direct oral anticoagulants were very new. Direct oral anticoagulants are now the recommended anticoagulant medication for most patients, and their management is relatively simple because of their short onset and rapid degradation. Because these medications can be held one to two days before surgery and restarted one to two days after surgery, bridging with heparin is not recommended, unlike with warfarin. The other interesting recommendation is to continue aspirin through the surgery because of little, if any, increase in bleeding.—Michael J. Arnold, MD, Assistant Medical Editor

Guideline source: American College of Chest Physicians

Published source: *Chest.* November 2022;162(5):e207-e243.

Available at: https://journal.chestnet.org/article/S0012-3692(22)01359-9/fulltext

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