

DECISIONS

Bridging anticoagulation for interruption of warfarin in a patient with atrial fibrillation



Choosing Wisely Canada

In partnership with the Canadian Medical Association

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A 78-year-old man with chronic nonvalvular atrial fibrillation presents to his family physician three weeks before a transurethral resection of the prostate for benign prostatic hyperplasia. His history includes hypertension and type 2 diabetes. He has no history of congestive heart failure, stroke or transient ischemic attack (TIA). His medications include warfarin, ramipril and metformin. He has a CHADS₂ score of 3 and a CHA₂DS₂-VASc score of 4 (Box 1).^{1,2}

Should this patient's anticoagulation be interrupted for surgery?

Both the procedural bleeding risk and anesthetic plan affect the decision of whether to interrupt anticoagulation. Prospective observational studies and randomized trials have shown that continuing anticoagulants for most skin, dental and cataract procedures is safe.³ Patients undergoing pacemaker or defibrillator insertion experience less bleeding when warfarin is continued perioperatively than when bridging with heparin is used.⁴ However, procedures with a major bleeding risk, including abdominal, thoracic, orthopedic and urologic surgeries, require anticoagulant interruption.³ As such, temporary warfarin cessation is appropriate for this patient.

Should bridging anticoagulation be used?

Guidelines suggest warfarin be stopped about five days before a major procedure.³ Anticoagulation is resumed when the postoperative bleeding risk is diminished, with full therapeutic effect delayed five to seven days. Bridging anticoagulation is the use of heparin (typically low-molecular-weight heparin [LMWH]) to minimize time off anticoagulation and reduce the risk of thrombosis.

Guidelines suggest that patients at high risk of thromboembolism receive bridging anticoagulation.³ This group includes patients with a CHADS₂ score of 5 or 6, most patients with mechanical heart valves, and those with recent ischemic stroke or TIA, or recent deep vein thrombosis or pulmonary embolism (Box 2).³ However, a meta-analysis involving more than 12 000 patients suggested

that bridging is associated with an increased risk of overall and major bleeding, with no improvement in stroke risk.⁵ Data from a prospective observational registry of more than 7000 US outpatients with atrial fibrillation also showed that patients undergoing anticoagulation bridging had more bleeding events, with a higher risk of arterial thromboembolism, hospital admission and death.⁶

These observations were confirmed in the BRIDGE trial, where patients with atrial fibrillation undergoing elective invasive procedures or surgeries were randomly assigned to bridging with therapeutic LMWH or placebo during warfarin interruption.⁷ The incidence of major bleeding was three times higher in the bridged group (3.2% v. 1.3%, $p = 0.005$ for superiority), and bridging was not associated with a reduction in the incidence of arterial thromboembolism (0.3% v. 0.4%, $p = 0.01$ for noninferiority).⁷ These results suggest that bridging is associated with increased bleeding without reduction in perioperative stroke in most patients, and it would not be recommended for this patient.

In the BRIDGE trial, however, patient groups at high risk of stroke were either excluded or underrepresented (e.g., 97% of patients had a CHADS₂ score of 4 or less).⁷ Until more data are available in these higher-risk groups, one could consider bridging anticoagulation in these patients, although deciding to forego bridging would also be reasonable.

In patients at moderate thrombotic risk, guidelines have suggested that decisions of whether to use bridging be made in consideration of individual patient factors and procedure-specific thrombotic risk.³ Results from the BRIDGE trial suggest that most patients at moderate risk, such as

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The clinical scenario is fictional.

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Box 1: Stratification for stroke risk in atrial fibrillation^{1,2}

The patient in this case has a CHADS₂ score of 3. This risk score quantifies stroke risk in nonvalvular atrial fibrillation. By this scheme, his estimated annual risk of stroke is 5.9% (95% confidence interval 4.6%–7.3%).

The patient's CHA₂DS₂-VASc score is 4. This risk score attempts to improve the estimation of stroke risk, particularly at lower CHADS₂ scores, by considering additional risk factors such as sex and the presence of vascular disease. By this score, his estimated annual risk of stroke (adjusted for warfarin use) is 4.0%.

Box 2: Suggested risk stratification scheme for perioperative thromboembolism³

Risk category (% annual risk of thromboembolism)	Atrial fibrillation	Mechanical heart valve	Venous thromboembolism (VTE)
High (> 10%)	CHADS ₂ score ¹ of 5 or 6; recent (within 3 mo) stroke or transient ischemic attack (TIA); rheumatic valvular heart disease	Any mitral valve prosthesis; any caged-ball or tilting-disk aortic valve prosthesis; recent (within 6 mo) stroke or TIA	Recent (within 3 mo) VTE; severe thrombophilia (e.g., deficiency of protein C, protein S or antithrombin; antiphospholipid antibodies; multiple abnormalities)
Moderate (5%–10%)	CHADS ₂ score ¹ of 3 or 4	Bi-leaflet aortic valve prosthesis and ≥ 1 risk factor (atrial fibrillation, prior stroke or TIA, hypertension, diabetes, congestive heart failure, age > 75 yr)	VTE within past 3–12 mo; nonsevere thrombophilia (heterozygous factor V Leiden or prothrombin gene mutation); recurrent VTE; active cancer (treated within 6 mo or palliative)
Low (< 5%)	CHADS ₂ score ¹ of 0 to 2 (no prior stroke or TIA)	Bi-leaflet aortic valve prosthesis without atrial fibrillation and no other risk factors for stroke	VTE > 12 mo previous

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Box 3: Choosing Wisely Canada* recommendation from the Canadian Hematology Society⁸

During interruption of warfarin anticoagulation for procedures, do not “bridge” with full-dose low-molecular weight heparin or unfractionated heparin unless the risk of thrombosis is high.

- Bridging anticoagulation has been shown to increase bleeding without reducing rates of perioperative arterial thromboembolism. Therefore, bridging should not be offered unless the thrombotic risk exceeds the bleeding risk.

*www.choosingwiselycanada.org/recommendations/hematology/

this patient, do not benefit from bridging. The Canadian Hematology Society suggests that bridging not be offered unless the thrombotic risk exceeds the bleeding risk (Box 3).⁸

What if this patient had been taking a direct oral anticoagulant?

The periprocedural management of patients taking direct oral anticoagulants has been reviewed elsewhere.⁹ Although bridging studies did not include patients taking direct oral anticoagulants, similar principles around decisions to withhold anticoagulation may be used. Given the rapid onset and shorter half-life of direct oral anticoagulants, bridging with heparin (or LMWH) is unnecessary and may lead to postoperative bleeding if reinstated prematurely following a procedure.¹⁰

Case revisited

The patient’s warfarin was held five days before his procedure without bridging anticoagulation. The surgery was uncomplicated with minimal blood loss, and his warfarin was restarted the next day with no bridging anticoagulation.

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CMAJ is collaborating with Choosing Wisely Canada (www.choosingwiselycanada.org), with support from Health Canada, to publish a series of articles describing how to apply the Choosing Wisely Canada recommendations in clinical practice.