Intermountain® Healthcare

CLINICAL GUIDELINE MAY 2018

# Peri-procedural Anticoagulant Management (Bridging)

Anticoagulant therapy often needs to be interrupted to allow for surgery or invasive procedures. When patients are taking warfarin, using a short-acting anticoagulant "bridge" with low molecular weight heparin has been suggested to reduce time spent without effective anticoagulation. However, in most circumstances, "bridging" with parenteral anticoagulants in such cases significantly increases the risk of bleeding without reducing thromboembolic events.[SEI, DOU] Given the lack of data indicating a net clinical benefit of bridging, this guideline suggests NOT bridging most patients. Exceptions are listed below.

**Bridging is never recommended for patients taking a direct oral anticoagulant (DOAC).**

**Do not interrupt anticoagulation** for the following minimal-bleeding risk procedures:

- Minor dermatologic procedures (e.g., excision of basal and squamous cell skin cancers, actinic keratoses, and premalignant or cancerous skin nevi)
- Cataract procedures
- Minor dental procedures (e.g., extractions, restorations, prosthetics, endodontics, dental cleanings, fillings)
- Pacemaker or cardioverter-defibrillator device implantation

## ▸ WARFARIN BRIDGING ASSESSMENT (for patients on warfarin)

Follow these and use table 1 below to conduct a bridging assessment:

- **Step 1:** Identify the patient's indication(s) for anticoagulation in **columns 1 and 2**. If none, the patient is considered "low risk" (see last row of table 1).
- **Step 2:** Identify if the procedure requires interruption of therapeutic anticoagulation
- **Step 3:** Proceed to the recommendations in **column 3**.

**TABLE 1. INDICATIONS AND PERIPROCEDURAL STRATEGY FOR PATIENTS ON WARFARIN**

| TE* Risk | Indication for antithrombotic bridging therapy | | Periprocedural strategy for patients on warfarin |
|---|---|---|---|
| | 1 | 2 | 3 |
| HIGH | **Mechanical heart valve** | • Any mitral mechanical valve<br>• Any mechanical valve and a history of prior stroke or TIA<br>• Aortic mechanical valve with risk factors (e.g., SF, EF < 35 %) | **Note: Strongly consider deferring procedure until ≥ 3 months after stroke or VTE event.**<br>• **Discontinue** warfarin 5 days prior to procedure.<br>• **Consider** initiating enoxaparin (1 mg/kg every 12 hours) 3 days prior to procedure.<br>• **Give** last enoxaparin dose 24 hours prior to the procedure.<br>• **Consider** INR check 1–2 days prior to the procedure. If INR ≥ 1.5, give low-dose oral vitamin K (1–2.5 mg).<br>• **Resume** warfarin 12–24 hours post procedure.<br>• **Resume** enoxaparin (1 mg/kg every 12 hours) 24–72 hours post procedure, **depending on adequate hemostasis.**<br>• **Consider** delayed resumption of enoxaparin for at least 72 hours if higher concern for bleeding.<br>• **Continue** both warfarin and enoxaparin until INR therapeutic. |
| | **Atrial fibrillation** | • $CHADS_2$ score ≥ 5 or $CHA_2DA_2$-VASc score ≥ 7<br>• Prior ischemic stroke, TIA, or systemic embolism in the last 3 months<br>• History of ischemic stroke or systemic embolism occurring with prior short-term interruption of anticoagulant therapy | |
| | **Venous thrombo-embolism (VTE)** | • Recent VTE (within the last 6 weeks)<br>• Severe thrombophilia (accurately diagnosed protein C/S or antithrombin deficiency, APAS, or multiple thrombophilias)<br>• Active cancer (including high thrombotic-risk cancer types, such as pancreatic, CNS, GI, lung, endocrine, head and neck; also includes ongoing treatment, treatment completed within the last 6 months, or palliative)<br>• History of recurrent VTE that occurred during short-term interruption of anticoagulation therapy | |
| LOW | Any patient not meeting the above criteria | | • **Discontinue** warfarin 5 days prior to procedure.<br>• **Consider:**<br>– INR check 1 to 2 days prior to procedure.<br>– Giving low-dose oral vitamin K (1–2.5 mg) if INR is ≥ 1.5.<br>• **Resume** warfarin within 12–24 hours post-procedure. |

* TE: thromboembolism; VTE: venous thromboembolism.

** May consider prophylaxis enoxaparin dosing in certain populations (e.g., high bleeding risk procedure, high bleeding risk patient, renal impairment).

**Note:** Overall quality of evidence surrounding bridging is low. The above represents best evidence and expert opinion (see bibliography).

# PERIPROCEDURAL INTERRUPTION OF DIRECT ORAL ANTICOAGULANTS (DOACS)

Interruption of direct oral anticoagulants may be required for surgeries or procedures. The duration of interruption is dependent upon the agent and the individual patient's renal function. Table 2 below provides drug-specific recommendations for interrupting a DOAC prior to either a high-or low- bleeding risk procedure for which anticoagulation should be interrupted. This table is meant to assist in clinical decision making; however, ultimate application of these recommendations is at the proceduralist's discretion.

**TABLE 2. DRUG-SPECIFIC RECOMMENDATIONS FOR INTERRUPTING DIRECT ORAL ANTICOAGULANTS (DOACS) PRIOR TO HIGH- OR LOW- BLEEDING RISK PROCEDURES**[BAR, BUR, DUB, KAA, SPY1, SPY2]

| | Estimated half-life | Low bleeding risk procedure[1] | High bleeding risk procedure[2] | Resumption[3] (low bleeding risk procedure) | Resumption[3] (high bleeding risk procedure) |
|---|---|---|---|---|---|
| **Dabigatran (BID dosing)** | | | | | |
| CrCl > 80 mL/min | t1/2 ~ 14 hours | # doses to hold: 2 | # doses to hold: 6 | 1 day after procedure (24 hours post-op[4]) | 3 days after procedure (48–72 hours postop[4]) |
| CrCl 30–79 mL/min | t1/2 ~ 19 hours | # doses to hold: 4 | # doses to hold: 8 | | |
| CrCl 15–29 mL/min | t1/2 ~ 28 hours | # doses to hold: 6 | # doses to hold: 10 | | |
| CrCl < 15 mL/min | Discontinue and proceed with procedure on an individualized basis. Elect alternate anticoagulation after the procedure should continued anticoagulation be required. | | | | |
| **Rivaroxaban (Once daily dosing)** | | | | | |
| CrCl > 30 mL/min | t1/2 ~ 9 hours | # doses to hold: 1 | # doses to hold: 2 | | |
| CrCl 15–29 mL/min | t1/2 ~ 10 hours | # doses to hold: 2 | # doses to hold: 3 | | |
| CrCl < 15 mL/min | Discontinue and proceed with procedure on an individualized basis. Elect alternate anticoagulation after the procedure should continued anticoagulation be required. | | | | |
| **Apixaban (BID dosing)** | | | | | |
| CrCl > 50 mL/min | t1/2 ~ 8 hours | # doses to hold: 2 | # doses to hold: 4 | | |
| CrCl 15–49 mL/min | t1/2 ~ 18 hours | # doses to hold: 4 | # doses to hold: 6 | | |
| CrCl < 15 mL/min | Discontinue and proceed with procedure on an individualized basis. Consider transitioning to warfarin thereafter if continued anticoagulation is required. | | | | |
| **Edoxaban (Once daily dosing)** | | | | | |
| CrCl > 30 mL/min | t1/2 ~ 10 hours | # doses to hold: 1 | # doses to hold: 2 | | |
| CrCl 15–29 mL/min | t1/2 ~ 17 hours | # doses to hold: 2 | # doses to hold: 3 | | |
| CrCl < 15 mL/min | Discontinue and proceed with procedure on an individualized basis. Elect an alternate anticoagulation after the procedure should continue anticoagulation be required. | | | | |

1. Abdominal hernia repair, abdominal hysterectomy, carpal tunnel repair, cholecystectomy, extraction of ≥ 3 teeth, dilation and curettage, EP study or radiofrequency catheter, ablation for supraventricular tachycardia (including, left-sided ablation via single transseptal puncture), endoscopy with biopsy or tissue removal, GI endoscopy ± biopsy, enteroscopy, biliary/pancreatic stent without sphincterotomy, endosonography without fine-needle aspiration, hemorrhoidal surgery, hydrocele repair, non-coronary angiography bronchoscopy ± biopsy, non-cataract eye surgery, prostate or bladder biopsy, shoulder/foot/hand surgery and arthroscopy
2. Any other major surgery (procedure duration > 45 min)
3. Resumption should occur at the discretion of the procedulalist and only once hemostasis is assured.
4. For patients at high risk for thromboembolism and bleeding after surgery, consider administering a prophylactic anticoagulation (e.g., enoxaparin 40 mg daily or unfractionated heparin 5000 IU BID/TID) on the first postoperative day.

These guidelines apply to common clinical circumstances, and may not be appropriate for certain patients and situations. The treating clinician must use judgment in applying guidelines to the care of individual patients.

## REFERENCES


BAR Baron TH, Kamath PS, McBane RD. Management of antithrombotic therapy in patients undergoing invasive procedures. *N Engl J Med.* 2013;368(22):2113-2124.

BUR Burnett AE, Mahan CE, Vazquez SR, Oertel LB, Garcia DA, Ansell J. Guidance for the practical management of the direct oral anticoagulants (DOACs) in VTE treatment. *J Thromb Thrombolysis.* 2016;41(1):206-32.

DOU Douketis JD, Spyropoulos AC, Kaatz S, et al. Perioperative bridging anticoagulation in patients with atrial fibrillation. *N Engl J Med.* 2015;373;823-833.

DUB Dubois V, Dincq A, Douxfils J, et al. Perioperative management of patients on direct oral anticoagulants. T*hrombosis Journal.* 2017;15(14):1-17.

KAA Kaatz S, Mahan CE, Nakhle A, et al. Management of elective surgery and emergent bleeding with direct oral anticoagulants. *Curr Cardiol Rep.* 2017;19(12):124.

SEI Seigal D, Yudin J, Kaatz S, et al. Periprocedural heparin bridging in patients receiving vitamin K antagonists: Systematic review and meta-analysis of bleeding and thromboembolic rates. *Circulation.* 2012;126(13):1630-1639.

SPY1 Spyropoulous AC, Al-Badri A, Sherwood MW, Douketis JD. Periprocedural management of patients receiving a vitamin K antagonist or a direct oral anticoagulant requiring an elective procedure or surgery. *Thromb Haemost.* 2016;14(5):875-885.

SPY2 Spyropoulous AC, Douketis JD. How I treat anticoagulated patients undergoing an elective procedure or surgery. *Blood.* 2017;120(15):2954-2962.


## BIBLIOGRAPHY


1. Clark NP, Witt DM, Davies LE, et al. Bleeding, recurrent venous thromboembolism, and mortality risks during warfarin interruption for invasive procedures. *JAMA Intern Med.* 2015;175(7):1163-1168.
2. Guyatt GH, Akle EA, Crowther M, Guttermand DD, Schuunemann HJ; American College of Chest Physicians Antithrombotic Therapy and Prevention of Thrombosis Panel. Executive summary: Antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians Evidence-based Clinical Practice Guidelines. *Chest.* 2012;141(2 Suppl):7S-47S.
3. Kovich O, Otley CC; Thrombotic complications related to discontinuation of warfarin and aspirin therapy perioperatively for cutaneous operation, *J AM Acad Dermatol.* 2003;482:233-237.
4. Spyropoulous AC, Turpie AG, Dun AS, et al; REGIMEN investigators. Clinical outcomes with unfractionated heparin or low molecular-weight heparin as bridging therapy in patients on long-term oral anticoagulants: The REGIMEN registry. *J Throb Haemost.* 2006;4(6):1246-1252.


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