

GUIDELINE FOR THE MANAGEMENT OF ORAL ANTICOAGULATION BEFORE AND AFTER ELECTIVE SURGERY

Revised Feb 10, 2004

A. OBJECTIVE

The objective of this guideline is to optimize the quality of care for patients who are require interruption of chronic oral anticoagulation for elective surgery.

B. STATEMENT OF THE PROBLEM

The management of patients whose oral anticoagulation is withdrawn prior to surgery represents a difficult dilemma. Interruption of oral anticoagulation increases the risk of thromboembolism, whereas aggressive peri-operative anticoagulation with heparin to bridge this period of thromboembolic vulnerability increases the risk of bleeding, particularly post-operatively. This guideline provides recommendations on when and how to use bridging anticoagulation.

C. LIMITATIONS OF THIS GUIDELINE

The perioperative management of anticoagulation is a controversial area because of the lack of data from randomized trials and prospective studies. It is recognized that other interpretations of the relevant literature and other clinical policies may be reasonable and appropriate.

Good judgement remains the cornerstone of clinical decision-making for individual patients. This guideline is intended to assist the clinician in decision-making, but cannot replace or impart good judgement. This guideline cannot and does not anticipate all of the individual clinical circumstances and special situations that arise in practice. For this reason, no clinician and no one evaluating the actions of a clinician should attempt to apply this guideline in a rote or blanket fashion.

D. GUIDELINE

1. For patients whose INR is between 2.0 and 3.0, discontinue warfarin 5 days prior to surgery (last dose given 6 days before surgery) and allow the INR to spontaneously fall. Warfarin should be withheld for a longer period of time if the INR is normally maintained above 3.0.
2. The INR should be measured the day prior to surgery. Vitamin K should be administered if the INR is deemed excessive.
3. Post-operatively, warfarin should be resumed when the patient is able to take medications by mouth.
4. The decision to use bridging anticoagulation (ie. therapeutic dose IV unfractionated heparin or SC low molecular weight heparin before and after surgery) should incorporate the recommendations in **table 1**.

Table 1. Recommendations on when to use bridging anticoagulation peri-operatively			
INDICATION FOR ANTICOAGULATION	THROMBOEMBOLISM RISK CATEGORY	PATIENT CHARACTERISTICS	RECOMMENDATION FOR PERI-OPERATIVE ANTICOAGULATION*
Mechanical heart valve	High risk	<ul style="list-style-type: none"> recent (within 1 month) stroke, TIA, or arterial thromboembolism any mechanical mitral valve caged ball or single leaflet tilting disc aortic valve 	bridging anticoagulation recommended
	Moderate risk	<ul style="list-style-type: none"> bileaflet tilting disc aortic valve and additional stroke risk factors 	consider bridging anticoagulation
	Low risk	<ul style="list-style-type: none"> bileaflet tilting disc aortic valve without additional stroke risk factors 	bridging anticoagulation not essential
Chronic atrial fibrillation	High risk	<ul style="list-style-type: none"> recent (within 1 month) stroke, TIA, or arterial thromboembolism rheumatic mitral valvular heart disease 	bridging anticoagulation recommended
	Moderate	<ul style="list-style-type: none"> chronic atrial fibrillation and additional stroke risk factors 	consider bridging anticoagulation
	Low	<ul style="list-style-type: none"> chronic atrial fibrillation without additional stroke risk factors 	bridging anticoagulation not essential
Venous thromboembolism (VTE)	High	<ul style="list-style-type: none"> recent VTE (within 1 month) active cancer antiphospholipid antibody 	bridging anticoagulation recommended
	Moderate	<ul style="list-style-type: none"> VTE within past 6 months VTE associated with previous discontinuation of warfarin recurrent VTE 	consider bridging anticoagulation, especially post-op [†]
	Low	<ul style="list-style-type: none"> none of the above high or moderate risk factors for VTE present 	pre-op bridging anticoagulation not essential, but consider therapeutic dose UFH or LMWH post-op [†]
Arterial thromboembolism	High	<ul style="list-style-type: none"> recent arterial thromboembolism (within 1 month) 	bridging anticoagulation recommended
	Moderate to low	<ul style="list-style-type: none"> arterial thromboembolism other than the above category 	consider bridging anticoagulation

* Patients not receiving therapeutic dose unfractionated heparin or LMWH after major surgery should receive appropriate prophylaxis for venous thromboembolism.

[†] Consider post-operative use of therapeutic dose anticoagulation with unfractionated heparin or LMWH in patients with a history of VTE who undergo surgical procedures associated with a high risk of VTE (orthopedic or major surgery).

5. Detailed recommendations for the use of therapeutic dose unfractionated or low molecular weight heparin are listed below:

a. IV UNFRACTIONATED HEPARIN BEFORE SURGERY

- i. After discontinuation of warfarin, patients should be admitted to hospital and started on IV unfractionated heparin in therapeutic doses. Since therapeutic oral anticoagulation will remain therapeutic for at least a day after the last warfarin dose, patients can be admitted on the second day after their last dose of warfarin.
- ii. IV heparin should be discontinued 6 hours prior to surgery.

b. IV UNFRACTIONATED HEPARIN AFTER SURGERY

- i. Full dose (therapeutic dose) IV unfractionated heparin should be started no sooner than 24 hours after major surgery when there is adequate post-op hemostasis. If there is evidence of surgical bleeding or if the patient is at high risk of bleeding, it should be delayed further. In situations where therapeutic dose IV unfractionated heparin is deferred beyond 24 hours, the administration of prophylactic dose LMWH or can be considered sooner (as early as the evening of the day of surgery).

IV heparin may be started sooner if the surgery or procedure is of a minor nature and the risk of bleeding is low.

- ii. Heparin should be started without a bolus, at no more than the expected maintenance infusion rate. To further minimize the risk of post-operative bleeding associated with persistently supratherapeutic PTT values that sometimes occur initially, a lower target PTT range of 45 - 60 seconds can be considered.
- iii. Heparin should be continued until the INR is therapeutic.

c. THERAPEUTIC DOSE SC LOW MOLECULAR WEIGHT HEPARIN (LMWH) BEFORE SURGERY

- i. For some patients, an acceptable alternative to IV unfractionated heparin is outpatient subcutaneous administration of LMWH in therapeutic doses. LMWH should be avoided in patients with renal failure. Weight-adjusted dosing without monitoring heparin levels may be inappropriate for patients who weigh less than 50 kg or greater than 90 kg.
- ii. The physician responsible for outpatient administration of LMWH will make the appropriate outpatient nursing arrangements for LMWH administration and monitoring for bleeding.
- iii. SC LMWH in a therapeutic dose should be started the second day after the last dose of warfarin.

- iv. The last pre-operative dose should be administered no less than 24 hours prior to surgery. At the discretion of the treating physician, patients may be admitted for IV heparin infusion after the last LMWH dose to provide therapeutic anticoagulation coverage until a few hours prior to surgery. In such patients, IV unfractionated heparin should be discontinued 6 hours prior to surgery.

d. THERAPEUTIC DOSE SC LMWH AFTER SURGERY

- i. Therapeutic dose SC LMWH should be started no sooner than 24 hours after major surgery. If there is evidence of surgical bleeding or if the patient is at high risk of bleeding, it should be delayed further. In situations where therapeutic dose LMWH is deferred beyond 24 hours, the administration of prophylactic dose LMWH can be considered sooner (as early as the evening of the day of surgery).

Therapeutic dose LMWH may be started prior to 24 hours after surgery if the surgery or procedure is of a minor nature and the risk of bleeding is low.

- ii. LMWH should be continued until the INR is therapeutic.

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