

How to stop warfarin for surgery

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One would think that there would be guidelines on how, when or if warfarin should be ceased before surgery but the reality is that this is often not the case. I remember working as a surgical resident in the pre-operative clinic and having to make this decision on the fly. I can only hope that the anaesthetic registrar who conducted the (parallel) anaesthetic clinic knew what he or she was doing.

In a nutshell:

Low thromboembolic risk:

- stop warfarin 5 days pre-op;
- restart warfarin post-op as soon as oral fluids are tolerated.

High thromboembolic risk:

- stop warfarin 4 days pre-op and start low molecular weight heparin (LMWH) at therapeutic dose;
- stop the LMWH 12-18 pre-op;
- restart LMWH 6 hours post-op (assuming haemostasis achieved);
- restart warfarin when oral fluids are tolerated;
- stop LMWH when INR = 2.0.

See below for details

Most patients are on warfarin for a good reason and its cessation may lead to a thromboembolic event. I do not believe that the risk has actually been quantified, though a useful indicator is to look at the risk of ischaemic stroke in patients on long term aspirin after its cessation. There is over a 3-fold increase in risk (1), i.e., substantially higher than the baseline risk for someone who had never taken aspirin in the first place.

Nevertheless, this has to be balanced against the increased risk of a substantial peri-operative bleed from anticoagulation. I find the following algorithm (2) instructive (adapted from Sridhar R., Grigg A.):

Risk of thromboembolism if anticoagulation is withdrawn		
	<i>Low</i>	<i>High</i>
Atrial fibrillation and/or cardiomyopathy	Without stroke or systemic embolisation in the last 12 months	With stroke or systemic embolisation within the last 12 months
Biological heart	Except during first three	During first three

valves	months	months
Prosthesis	Vascular grafts	Cardiac mechanical valves
Venous thrombosis	Not within the last three months and without a confirmed hypercoagulable state	Within the last three months, or recurrent venous thrombosis
Systemic arterial emboli	Non-recurrent	Recurrent
Note: <i>two low-risk factors = high risk</i>		

Recommendations for perioperative anticoagulation of patients undergoing major elective surgery		
<i>Day</i>	<i>Low-risk patients</i>	<i>High-risk patients</i>
-5	Cease warfarin	
-4	No anticoagulation	Cease warfarin: <ul style="list-style-type: none"> • Measure INR • Start full dose unfractionated heparin (UFH) infusion as inpatient OR LMWH as outpatient. • Continue daily until day -1.
-1		Stop LMWH a minimum of 12 hours and UFH six hours before surgery.
+1	Start warfarin as soon as oral fluids tolerated using the preoperative maintenance dose.	Once haemostasis secured, and generally after at least six hours post surgery: <ul style="list-style-type: none"> • recommence LMWH (preferred) or UFH • start warfarin as soon as oral fluids tolerated using the preoperative maintenance dose

Tips

- Where in doubt, especially in someone with a complex medical history or an unusual clotting disorder, ask for help from the haematologists.

- At the end of the day, there is very little that you can do for thromboembolism while bleeding is often salvageable. I would err towards bleeding (or where it is particularly problematic, postponing surgery).
- It is the surgeon who cuts the patient so the above algorithm is only a guide. Many surgeons are much more anxious about operating on an anticoagulated patient.
- Don't forget that elective operations are *elective* (i.e., optional and possibly unnecessary). Someone who comes in for a total knee replacement and then suffers a massive disabling stroke is an absolute disaster. Be especially careful with the elective patients.

Reference articles

- (1) Maulaz AB., Bezerra DC., Michel P. Bogousslavsky J. Effect of discontinuing aspirin therapy on the risk of brain ischemic stroke. Archives of Neurology 62(8):1217-20, 2005 Aug. [[Link](#)]
- (2) Sridhar R., Grigg A. The perioperative management of anticoagulation. Aust Prescr 2000;23:13-6. [download [PDF](#) :: 161 Kb]

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