SCP Radiology Guideline - periprocedural management of coagulation status and hemostasis risk in percutaneous image-guided interventions

Category 1: Procedures with Low Risk of Bleeding, Easily Detected and Controllable

Procedures	Pre-procedure Laboratory Testing	Management
Vascular: • Dialysis access interventions • Venography • Central line removal • IVC filter placement • PICC line placement **Nonvascular:** • Drainage catheter exchange (biliary, nephrostomy, abscess catheter) • Thoracentesis • Paracentesis • Superficial aspiration/drainage (excludes intrathoracic or intraabdominal sites) • Superficial biopsy (thyroid, superficial lymph node, breast) • Facet + joint injections	**INR:** recommended: • Patients receiving warfarin • Known/suspected liver disease • Reliable patient risk history not obtainable **aPTT:** routinely recommended for patients receiving intravenous unfractionated (UFH) heparin **Platelet count:** not routinely recommended **Hb:** not routinely recommended **INR/PT/aPTT/platelets:** If known coagulopathy/platelet dysfxn (e.g. Haemophilia, VWD, DIC, thrombocytopenia, anti-phospholipid syndrome)	**INR:** correct to < 2 (i.e. FFP, vitamin K) **aPTT:** stop or reverse heparin for values >1.5 times control **Platelets:** transfusion recommended for counts <50,000/µl **Hb:** no recommended threshold for transfusion

Category 2: Procedures with Moderate Risk of Bleeding

Procedures	Pre-procedure Laboratory Testing	Management
Vascular: • Angiography, arterial intervention with access size up to 7 F • Venous interventions • Chemoembolization • Uterine fibroid embolization • Transjugular liver biopsy • Tunneled central venous catheter • Subcutaneous port device **Nonvascular:** • Intraabdominal (not liver/spleen), retroperitoneal (not renal), lung+chest wall - drainage or biopsy • Percutaneous cholecystostomy • Gastrostomy: initial placement + exchange • RFA procedures: simple • Spine procedures (vertebroplasty, kyphoplasty, lumbar puncture, myelography, epidural injection) • Biliary tube exchange	**INR:** recommended **aPTT:** recommended in patients receiving intravenous unfractionated (UFH) heparin **Platelet count:** not routinely recommended **Hb:** not routinely recommended **INR/PT/aPTT/platelets:** If known coagulopathy/platelet dysfxn (e.g. Haemophilia, VWD, DIC, thrombocytopenia, anti-phospholipid syndrome)	**INR:** correct to < 1.5 (i.e. FFP, vitamin K) **aPTT:** stop or reverse heparin for values >1.5 times control **Platelets:** Transfusion recommended for counts <50,000/µl **Hb:** no recommended threshold for transfusion

Category 3: Procedures with Significant Bleeding Risk, Difficult to Detect or Control		
Procedures	Pre-procedure Laboratory Testing	Management
Vascular: • TIPS **Nonvascular:** • Renal/hepatic/splenic biopsy • Biliary intervention (new tract) • Nephrostomy: original + exchange • RFA procedures: complex	**INR:** recommended **aPTT:** recommended in patients receiving intravenous unfractionated (UFH) heparin. No consensus on patients not receiving heparin **Platelet count:** routinely recommended **Hb:** routinely recommended **INR/PT/aPTT/platelets:** Known coagulopathy/platelet dysfxn (e.g. Haemophilia, VWD, DIC, thrombocytopenia, anti-phospholipid syndrome)	**INR:** correct to < 1.5 (i.e. FFP, vitamin K) **aPTT:** stop or reverse heparin for values >1.5 times control **Platelets:** Transfusion recommended for counts <50,000/µl **Hb:** no recommended threshold for transfusion

TABLE 3: Recommendations for Management of Anticoagulants

	Interval Between Last Dose and Procedure			Resumption After Procedure		
Medication	Low Bleeding Risk	Medium Bleeding Risk	High Bleeding Risk	Low Bleeding Risk	Medium Bleeding Risk	High Bleeding Risk
Warfarin	5 d	5 d	5 d	12 h	12 h	12–24 h
UFH (IV)	1 h	4 h	4 h	1 h	1 h	1 h
UFH (SQ)	4 h	4 h	6 h	Immediate	Immediate	1 h
LMWH (SQ)	12 h	12 h	24 h	6 h	6 h	6 h
Dabigatran	24 h	48 h	72 h	24 h	48 h	48 h
Rivaroxaban	24 h	48 h	48 h	24 h	48 h	48 h
Apixaban	24 h	48 h	72 h	24 h	48 h	48 h
Fondaparinux	24 h	36 h	48 h	6 h	6 h	6 h
Acova	None	4 h	4 h	1 h	1 h	1 h
Desirudin	None	4 h	4 h	1 h	1 h	1 h
Bivalirudin	None	4 h	4 h	1 h	1 h	1 h

Note—UFH = unfractionated heparin, SQ = subcutaneous, LMWH = low-molecular-weight heparin. Data from [6–9, 13, 19].

TABLE 5: Recommendations for Management of Antithrombotics

	Interval Between Last Dose and Procedure			Resumption After Procedure			
Medication	Low Bleeding Risk	Medium Bleeding Risk	High Bleeding Risk	Low Bleeding Risk	Medium Bleeding Risk	High Bleeding Risk	Comment
ASA, low dose	None	None	5 d	Immediate	Immediate	Immediate	
ASA, high dose	None	5 d	5 d	Immediate	Immediate	Immediate	
ASA and dipyridamole	2 d	5 d	5 d	Immediate	Immediate	Immediate	
NSAIDs	None	None	24 h–10 d	Immediate	Immediate	Immediate	Variability in duration of action, long acting NSAIDs require longer interval before procedure
Cilostazol	None	None	24 h	Immediate	Immediate	Immediate	
Clopidogrel	5 d	5 d	5 d	Immediate	Immediate	Immediate	
Prasugrel	5 d	5 d	7 d	24 h	24 h	24 h	
Ticagrelor	5 d	5 d	7 d	24 h	24 h	24 h	
Tirofiban	—	—	—	—	—	—	Recent surgery is a contraindication (within 4 wk)
Eptifibatide	—	—	—	—	—	—	Recent surgery is a contraindication (within 6 wk)
Abciximab	NR	NR	NR	—	—	—	Recent surgery is a contraindication (within 6 wk)

Note—Dash (—) indicates that there are no recommendations available. ASA = acetylsalicylic acid (aspirin), NSAIDs = nonsteroidal antiinflammatory drugs, NR = not recommended. Data from [6–9, 13, 19, 41].

Table 2. Current Medications and Management Recommendations (4–11)

Medications	Category I Procedure (Low Bleeding Risk)	Category II Procedure (Moderate Risk of Bleeding)	Category III Procedure (Significant Bleeding Risk/ Bleeding Difficult to Detect)
NSAIDs			
Short-acting (half-life 2–6 h)	Do not withhold	Do not withhold	Withold 24 h before procedure
• Ibuprofen • Diclofenac • Ketoprofen • Indomethacin			
Intermediate-acting (half-life 7–15 h)	Do not withhold	Do not withhold	Withhold 2–3 d before procedure
• Naproxen • Sulindac • Diflunisal • Celecoxib			
Long-acting (half-life > 20 h)	Do not withhold	Do not withhold	Withhold 10 d before procedure
• Meloxicam • Nabumetone • Piroxicam			

Summary: Management of Common Anticoagulant Therapies

Withholding oral anticoagulant and antiplatelet therapy should be discussed with the prescribing physician in advance of the procedure.

Intravenous heparin infusion should be stopped or reversed for aPTT values that are greater than 1.5 times normal values.

LMWH
For procedures with low/moderate risk of bleeding, LMWH should not be administered for 12 hours before procedure. For procedures with high risk of bleeding, LMWH should not be administered for 24 hours before procedure.

Warfarin should be discontinued 5 days before all procedures, and INR levels should be checked on the day of the procedure.

Clopidogrel should be withheld for 5 days before a procedure.

Aspirin LD should be withheld for 5 days only for procedures that have a high risk of bleeding. The prescribing physician who is managing the patient's anticoagulant therapy should be contacted to determine whether a periprocedural heparin "bridge" is required. In certain circumstances, a patient may receive a fresh frozen plasma transfusion or recombinant factor VII to temporarily correct the coagulopathy.

NSAIDS should be withheld for 24hrs – 10 days only for procedures that have a high risk of bleeding. See chart above for guidelines

New oral anticoagulants (eg, rivaroxaban, apixaban, edoxaban, and dabigatran) should be stopped at least 1 day before elective procedures. Longer drug holidays (3–5 days) are needed for patients with renal dysfunction who receive dabigatran and for patients with hepatic dysfunction who are treated with apixaban.

Summary: Management of Common Antiplatelet Agents

Antiplatelet agents ticlopidine, clopidogrel, prasugrel, ticagrelor continue through the life of the platelet, which can be 5–9 days. Therefore, these agents should be stopped 5 days before elective procedures.

Glycoprotein IIb/IIIa receptor antagonists prevent platelet binding to fibrinogen and include **abciximab, eptifibatide, tirofiban**. Reversing the effects of these agents can be achieved by means of discontinuation and allowing time for clearance. Abciximab has an approximate 12-hour pharmacological effective half-life, whereas the other agents are shorter acting (2–4 hours). In theory, their effect can be overcome by the transfusion of unaffected platelets.

Recommendations for Observation after Interventional Procedure in Patients on Antithrombogenic Medications

Low bleeding risk: As a general rule, patients do not need to be monitored after the procedure:

- Hospitalized patients may return to their room
- Outpatients may be discharged from the hospital without observation.

Moderate or high bleeding risk: Patients are closely monitored for changes in post-procedure hemodynamic status:

- Outpatients should be observed 1–2 hours before discharge from the hospital to ensure hemodynamic stability.
- Inpatients are returned to their floor with instructions for vitals monitoring for the first 2 hours after the procedure.
- Pain out of proportion to expected postprocedural discomfort and hemodynamic instability should be evaluated immediately by the radiologist.
- CT remains the imaging choice for the identification of bleeding complications after percutaneous interventions. Occasionally these complications are severe enough to warrant diagnostic angiography and embolization.

Policy references available on request

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