Antiplatelet and Antithrombotic Therapy in PCI

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Advances in drug stent-eluting technology, antiplatelet pharmacotherapy, and novel parenteral and oral anticoagulants have led to a constant evolution in periprocedural antithrombotic strategy. The following chapter outlines our cardiac catheterization laboratory's current approach to antiplatelet and anticoagulation therapy in various clinical settings based on current guidelines, data, and expert opinion.

Oral Antiplatelet Therapy

Aspirin – all patients

- For elective patients, with or without known stable CAD, aspirin 162 mg should be given at time of obtaining consent.
- For ACS (acute coronary syndrome) patients, non-enteric aspirin 325 mg should be given as early as possible prior to PCI.
- Post-PCI, aspirin 81 mg daily should be continued indefinitely.

Dual antiplatelet therapy

- All patients should be counseled on the necessity of and concomitant risk associated with dual antiplatelet therapy (DAPT) prior to placement of intracoronary stents, especially drug-eluting stents (DES).

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- For patients unable or unwilling to comply with recommended duration of dual antiplatelet therapy, alternative revascularization (bypass) or bare metal stents (BMS) should be considered.

P2Y12 antagonist therapy

- Pre-/intra-procedural loading doses for patients *not previously taking the same* P2Y12 receptor inhibitor for ≥5 days:
  - Clopidogrel 600 mg (patients who received fibrinolytics <24 h should receive a 300 mg loading dose if they are <75 years of age and 75 mg loading dose if >75 years of age)
  - Prasugrel 60 mg
  - Ticagrelor 180 mg
- Loading doses for patients *already taking the same* P2Y12 receptor inhibitor for ≥5 days:
  - Clopidogrel 300 mg
  - Prasugrel 30 mg
  - Ticagrelor 90 mg
- For clopidogrel *nonresponders* (with confirmed compliance), defined as platelet reactivity unit (PRU) >230, load with prasugrel 60 mg or ticagrelor 180 mg.

Special considerations

- In patients who received fibrinolytics <24 h, only clopidogrel should be used.
- Prasugrel (contraindicated in patients with a history of TIA/CVA and avoided in patients weighing >60 kg or >75 years of age) should be preferred in the following clinical situations:
  - STEMI
  - Diabetics with multivessel disease
  - Clopidogrel allergy
  - Clopidogrel nonresponder (PRU >230 on maintenance dose of clopidogrel)
  - Stent thrombosis on clopidogrel
- In patients *>75 years old or with history of TIA/CVA*, *or weighing <60 kg*, ticagrelor should be preferred in the following clinical situations:
  - NSTEMI
  - Complex PCI
  - Clopidogrel allergy
  - Clopidogrel nonresponder (PRU >230 on maintenance dose of clopidogrel)
  - Stent thrombosis on clopidogrel
- For *pre-liver* transplant patients, BMS are preferred to enable shorter duration of DAPT, with the exception of left main, bifurcation, or proximal LAD lesions, where DES may be preferred.
- For *pre-renal* transplant patients, DES are generally preferred, unless a transplant date is set within 1–4 months.

Table 5.1 Duration of DAPT

Duration of pharmacotherapy				
		Antiplatelet		Anticoagulant
		Aspirin 81 mg	P2Y12 antagonist	Warfarin[a]
Bleed risk	*Stent type*	Daily	Prasugrel Ticagrelor Clopidogrel	Dabigatran[b] Apixaban[b] Rivaroxaban[b]
Low	DES	3 months	Indefinitely	Indefinitely
Low	BMS	1 month	Indefinitely	Indefinitely
High	DES	1 month	Indefinitely	Indefinitely
High	BMS	1 month	Indefinitely	Indefinitely

[a]*Non-valvular* AF, the goal INR 2–2.5; *valvular* AF, mechanical valve, thromboembolism: goal INR 2.5–3

[b]Only approved for *non-valvular* AF; dosing should be adjusted for renal impairment, weight, drug interactions

Duration of DAPT (See Table 5.1)

- All ACS patients should receive 12 months of DAPT.
- Non-ACS patients receiving DES should receive 12 months of DAPT.
- Non-ACS patients receiving BMS should receive 1 month of DAPT.
- Prolonged DAPT beyond 12 months may be considered in patients tolerating therapy without bleeding issues, with complex disease requiring multiple stents, and/or significant residual CAD.
- Combined dosing for P2Y12 antagonists with aspirin 81 mg daily:
  - Clopidogrel 75 mg orally once daily
  - Prasugrel 5 mg orally once daily (10 mg daily in patients >100 kg)
  - Ticagrelor 90 mg orally twice daily

Antiplatelet therapy in PCI patients requiring oral anticoagulation

- All patients are loaded with aspirin and P2Y12 antagonist, regardless of long-term anticoagulant requirement.
- Patients at *high*-risk for bleeding:
  - History of prior bleeding
  - Age >75 years
  - Renal insufficiency (chronic kidney disease stage 3, estimated glomerular filtration rate <60 mL/min/1.73 m^2)
  - Uncontrolled hypertension
  - History of peptic ulcer disease
  - Baseline anemia, thrombocytopenia (hematocrit <28 %, platelets <100 K)
- In patients at higher risk for bleeding, clopidogrel is preferred as the initial P2Y12 antagonist of choice. If the patient is a clopidogrel nonresponder, ticagrelor is the next preferred option. Prasugrel is generally avoided for patients on warfarin [1].

- For duration of antiplatelet therapy in the setting of long-term anticoagulation, see Table 5.1.
- Post-PCI resumption of anticoagulant therapy [2–6]:
  - Warfarin should be dosed the *same day/evening* due to expected delay in achieving therapeutic INR range.
  - New oral anticoagulants should be dosed the *following day*, unless there is a compelling indication for immediate resumption (below) [7].
  - In patients with compelling indications requiring immediate anticoagulation (or re-bridge to oral anticoagulation) post PCI, such as acute venous/pulmonary thromboembolism or mechanical valve, a heparin drip may be started without bolus 2 h post PCI with successful hemostasis using a closure device or 6 h after sheath pull with successful hemostasis using manual compression.

Anticoagulation for PCI

- Administer bivalirudin bolus (0.75 mg/kg) via the intra-arterial sheath and begin continuous infusion (1.75 mg/kg/h).
- Check activated clotting time (ACT) 3 min after bolus:
  - For ACT <250, administer additional 1/2 bolus of bivalirudin.
  - For ACT 251–299, administer additional 1/3 bolus of bivalirudin.
  - Guiding catheter may be inserted once ACT> 200.
  - Intracoronary guidewire/equipment may be inserted once ACT >300.
- Post PCI:
  - For patients naïve to clopidogrel (on therapy <1 week or receiving the first time load of 600 mg <2 h prior to PCI), bivalirudin infusion should be continued for 2 h from time of stent implantation.
  - For patients receiving prasugrel or ticagrelor (on maintenance therapy or receiving the first time load on the table), bivalirudin infusion can be discontinued as soon as the PCI is completed.
  - For patients requiring an periprocedural glycoprotein (GP) IIb/IIIa inhibitor bolus, bivalirudin infusion can be stopped after administration of the GP IIb/IIIa bolus.

Parenteral antiplatelet therapy

- Due to up-front loading of P2Y12 antagonists and standard use of bivalirudin for anticoagulation during PCI, in our practice, we reserve GP IIb/IIIa antagonist administration for bailout purposes only.
- At the discretion of the operator, single (or double) bolus eptifibatide (single = 180 mcg/kg) may be administered in cases of *edge dissection*, *side branch closure*, *slow flow*, *no reflow*, *embolization*, and *thrombus* [8].
- For patients receiving abciximab, platelet count should be checked 3 h post procedure and the following morning.
- For patients receiving eptifibatide, platelet count should be checked 6 h post procedure and the following morning.

- In the rare case that GPIIb/IIIa infusion is utilized, the infusion should be discontinued if any significant thrombocytopenia develops (platelets <100 K).
- Protocol for post-procedural thrombocytopenia.

Platelets <20 K

- Discontinue all antiplatelet therapies.
- Transfuse 5 or more units of platelets until platelet count >20 K.
- Aspirin 81 mg and clopidogrel 75 mg can be resumed once platelet count >50 K.
- Platelet count should be checked daily until >70 K.

Platelets 20–50 K

- Discontinue GP2b3a inhibitor.
- Transfuse platelets only for active bleeding.
- Aspirin 81 mg and clopidogrel 75 mg can be resumed once platelet count >50 K.

Platelets 50–100 K

- Discontinue GP2b3a inhibitor.
- Aspirin 81 mg and clopidogrel 75 mg can be continued as long as platelet count remains >50 K.

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