

A CONCISE CLINICAL REVIEW ON ANTICOAGULANTS

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ABSTRACT

Venous thromboembolism (VTE) is a major cause of morbidity and mortality worldwide, requiring prompt and effective anticoagulation therapy. Anticoagulants can be administered parenterally or orally, each route having specific advantages, limitations, and clinical indications. Parenteral anticoagulants such as unfractionated heparin (UFH), low-molecular-weight heparins (LMWHs), fondaparinux, argatroban, and bivalirudin play a critical role in the acute management of thrombotic disorders, particularly in hospitalized, critically ill patients, during pregnancy, and in conditions such as acute coronary syndrome and heparin-induced thrombocytopenia (HIT). However, their use is often associated with patient discomfort due to intravenous or subcutaneous administration and complications such as bleeding, HIT, and osteoporosis. Orally administered anticoagulants, including vitamin K antagonists (VKAs) and direct oral anticoagulants (DOACs) such as dabigatran, rivaroxaban, apixaban, and edoxaban, offer improved patient convenience and adherence. DOACs demonstrate predictable pharmacokinetics, fewer drug–food interactions, and reduced need for routine monitoring, making them preferable in many clinical settings. Bleeding remains the most significant complication across all anticoagulant classes, necessitating individualized management strategies based on bleeding severity, patient characteristics, and the pharmacological properties of the anticoagulant used. This review summarizes the indications, complications, and management principles of parenteral and oral anticoagulants in VTE, highlighting the importance of individualized therapy to optimize safety and therapeutic outcomes.

KEYWORDS: Anticoagulation, Direct Oral Anticoagulants, Vitamin K antagonists, DVT , VTE, Haemorrhage.

INDICATIONS

VTE patients treated with parentally administered drugs, i.e., heparin (derivate), bilirubin, and argatroban, can experience major discomfort with imperative intravenous or subcutaneous injections. Oral anticoagulants are easier to administer, so, for this reason, they can be preferred to treat thrombotic diseases, depending on the individual patient’s needs and their medical indication. respectively. Indications for the parenterally administered anticoagulants unfractionated heparin (UFH), enoxaparin, fondaparinux, argatroban, and bilvarudin. * based on study using another LMWH, dalteparin. Indications for the orally administered anticoagulants warfarin, dabigatran, rivaroxaban, apixaban, and edoxaban.

Drugs	Indications
Enoxaparin	Treatment of VTE Treatment of ACS Prophylaxis/bridge therapy for AF/cardioversion, Prophylaxis of VTE in the medically ill or surgical population, Prophylaxis of VTE in the trauma patients,
Dalteparin	Treatment of VTE, Treatment of ACS, Prophylaxis of VTE after hip or other major surgery (first month), Prophylaxis of VTE in the medically ill or surgical population
Unfractionated heparin	Treatment of VTE , Treatment of ACS, Bridge therapy for AF, cardioversion, Prophylaxis of VTE in the medically ill or surgical population, Prophylaxis of VTE in pregnancy (with prior VTE)
Fondaparinux	Treatment of VTE, Treatment of STEMI and NSTEMI Prophylaxis of VTE in major surgery and acute medically ill
	PCI (with or without glycoprotein IIB/IIIA inhibitor), Treatment of ACS, Treatment and prophylaxis of HITa
Argatroban	Treatment and prophylaxis

	of HITT, PCI
Desirudin	Prophylaxis of DVT in patients undergoing elective hip replacement surgery
Warfarin	Treatment of VTE, Atrial fibrillation, Post-MI, Mechanical valve in the atrial position, Mechanical valve in the mitral position, Bioprosthetic valve in the mitral position
Dabigatran etexilate	Stroke and systemic Embolism prophylaxis in non-valvular AF
Rivaroxaban	Stroke prophylaxis in non-valvular AF, Treatment of DVT or PE, DVT or PE secondary prophylaxis, DVT prophylaxis following hip or knee replacement surgery,

COMPLICATIONS

The major complications of UFH therapy include:

- Bleeding (major bleeding, 0–7 %; fatal bleeding, 0–3 %)
- Heparin-induced thrombocytopenia (HIT, 1–5 %).
- Patients Receiving UFH for periods of more than 1 month are also at an increased risk for osteoporosis and development of vertebral fractures (approximately 2 % incidence).
- Haemorrhage is the most common complication with DTIs, Bleeding is a major concern with warfarin therapy.
- Treatment with VKA increases the risk of major bleeding by 0.3–0.5 % per Year and the risk of intracranial haemorrhage by approximately 0.2 % per year compared to controls.
- The most common adverse events reported with dabigatran Include dyspepsia, dizziness, headache, dyspnoea, and Shortness of breath. Abdominal pain and gastritis-like Symptoms may be related to the capsule formulation which Can be combated by taking the medication with food.

MANAGEMENT

The type of bleeding and patient/anticoagulant drug characteristics are key aspects to consider for successful bleeding management.

Given the short half-life of DOACs, most non-MB complications can be safely managed only with discontinuation of the anticoagulant and supportive measures.

- Systolic blood pressure should be lowered to 140 mm Hg in all patients with ICH.

- Specific coagulation tests that measure the anticoagulant activity of DOACs [diluted thrombin time (dTT) and anti-Xa chromogenic assay] play a key role in the management of MB that is not immediately life-threatening, in as much as they enable selecting only those patients who, having therapeutic plasma concentration of DOACs are truly in need of antifibrinolytic therapy and/or anticoagulant reversal agents.
- Tranexamic acid should be considered in cases of MB, especially in trauma patients.
- Conversely, high doses of this should be avoided in patients with GIB in whom it will not reduce mortality and may even increase the risk of VTE events, particularly in patients with liver disease or with suspected variceal bleeding.
- Specific measures should be adopted in cirrhotic patients, as extensively reviewed elsewhere [99]. In the case of bleeding at a critical site (e.g., intracranial, ocular, thoracic, abdominal, pericardial, retroperitoneal)/life-threatening MB or MB not responding to the general control measures, specific (idarucizumab for dabigatran; andexanet alfa for FXa inhibitors) or unspecific [4-factor prothrombin complex concentrates (4-F PCC)] anticoagulant reversal agents can be indicated as a life-saving measure [2, 3, 132].
- In patients receiving VKA treatment, the administration of 10 mg intravenous (IV) vitamin K and CCP-4F according to body weight and INR value is recommended [132]. Endoscopic, radiological, or surgical mechanical homeostasis procedures should be performed whenever necessary

CONCLUSION

Venous thromboembolism (VTE) requires effective anticoagulation to reduce morbidity and mortality. Parenteral anticoagulants such as unfractionated heparin, low-molecular-weight heparins, fondaparinux, and direct thrombin inhibitors are widely used in acute and high-risk settings but are associated with injection-related discomfort and complications, particularly bleeding and heparin-induced thrombocytopenia. Oral anticoagulants, including vitamin K antagonists and direct oral anticoagulants (DOACs), offer greater convenience, predictable pharmacokinetics, and improved patient adherence. Bleeding remains the major adverse event with all anticoagulant therapies, requiring individualized management strategies. This article summarizes the indications, complications, and management of parenteral and oral anticoagulants used in VTE.

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