Anticoagulation in chronic hemodialysis

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Patients who are on hemodialysis requires anticoagulation to prevent thrombosis in the blood circuit.

Anticoagulation in routine hemodialysis consists of a standard dose of unfractionated heparin (UFH) given as a bolus at the start of the dialysis treatment, with a mid-treatment dose to maintain suitable anticoagulation. Although UFH remains the most commonly used anticoagulant, it does not prevent platelet microthrombi formation, and still carries a considerable risk of bleeding.

UFH is now being replaced by low-molecular-weight heparins (LMWHs) in an expanding number of countries, particularly in Europe. This trend is attributable to the ease and convenience of the administration of LMWHs (single bolus for standard dialysis sessions) coupled with their reliability and predictability of dosing. LMWHs have a more rapid onset of action than UFH and reduce membrane fibrin and platelet deposition. The choice of which LMWH to use depends on the duration and frequency of the dialysis sessions due to various half-lives of each LMWH agents.

For patients who are allergic to heparin or have heparin-induced thrombocytopenia (HIT), clinicians can choose alternative anticoagulants - direct thrombin inhibitors (argatroban and hirudin) and heparinoids. All are costly options, with an increased risk of hemorrhage as they are systemic anticoagulants. Argatroban requires an infusion, whereas lepirudin and danaparoid are given as boluses because of their prolonged half-lives.

In patients at risk of bleeding, regional anticoagulants enable anticoagulation to be limited to the extracorporeal circuit. Prostanoids and nafamostat mesilate are expensive regional anticoagulants. A citrate-based dialyzate has now been introduced that might enable heparin-free dialysis or reduce systemic anticoagulant requirements