How to reduce the exposure to anticoagulants when performing haemodialysis in patients with a bleeding risk.  
A study of methods used in clinical practise

Malin Skagerlind

Akademisk avhandling

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Fakultetsopponent: Docent Fredrik Uhlin,
Linköpings Universitet, Linköping, Sverige.
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Abstract
When a patient suffers from kidney failure and has an enhanced risk of bleeding, the standard intermittent haemodialysis (SHD), where a bolus dose of anticoagulant is given, becomes a problem. The overall aim of this thesis was to investigate alternatives to standard anticoagulation when dialysing patients with an increased bleeding risk. The first study examined a low-dose anticoagulation model (Heparin-Albmin-priming, HA). The aim was to clarify to what extent this priming procedure was safe and efficient during SHD for patients with a bleeding risk. There was no difference in the extent of prematurely interrupted HD sessions when comparing HA to SHD – acute dialysis in patients with no risk of bleeding, (2.2% vs. 4.3%), while only half of the anticoagulation dose was necessary. Study 2 was performed to further clarify this finding in an extended group using either the SHD or HA protocol and to compare changes between different dialyser material and sizes regarding clotting. Even here there was no difference in the extent of prematurely interrupted HA-dialyses (0.8%) compared to SHD (1%). A dialyser 1.7m² was shown to be more prone to cloting compared to smaller dialysers. Study 3 was an experimental in vitro study using donated blood from healthy humans to perform sham dialyses in a recirculation in vitro system. The experiments indicated that priming with HA or with heparin in saline enabled fulfilment of all the in vitro dialyses. Study 4 was a clinical randomized study that compared four different low-dose anticoagulation models to SHD. The low dose models were Heparin-priming, HA-priming, HA-priming in combination with a citrate containing dialysate, and a dialyzer manufactured with a heparin coating, Evodial®. Heparin-priming was least suitable with most clotting - 33% interrupted dialysis and the highest amount of extra unfractionated heparin (UFH) doses required. HA in combination with citrate containing dialysate and a dialyser manufactured with a heparin-grafted membrane (Evodial®) were the most preferable with activated partial thromboplastin times within references, and a low amount of extra UFH required. However, Evodial had an insufficient urea reduction rate. One patient suffered from a severe hypersensitivity reaction using Evodial® while no other side effects were noticed during the study. In conclusion, acute kidney injury is a life-threatening situation that includes patients with an increased risk for bleeding that need haemodialysis for survival. If intermittent haemodialysis is the selected option, priming the extra corporeal circuit with HA combined with citrate dialysate is a preferred option for anticoagulation.

Keywords
Haemodialysis, haemorrhage, priming, safety

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