Implementing a Statistical Model for Protamine Titration: Effects on Coagulation in Cardiac Surgical Patients

Oskar Hälgren¹-², Staffan Svennmarker¹-², Micael Appelblad¹-². ¹Heart Centre, Norrlands University Hospital Umeå (SE); ²Dept of Public Health and Clinical Medicine, Umeå University.

Abstract

Objectives: To implement a statistical model for protamine titration

Design: Prospective randomised trial

Setting: University hospital

Participants: Sixty (n=30+30) elective patients scheduled for coronary artery bypass surgery randomised into two groups.

Interventions: Protamine dose calculated according to statistical computation or to a fixed protamine-heparin dose ratio (1:1).

Measurements and Main Results: Both groups demonstrated equal patient demographics and intraoperative data. Coagulation effects were evaluated by rotational thromboelastometry. Using statistical modelling reduced (P=0.00) the protamine dose from 426 ±43 mg to 251 ±66 mg followed by significantly (P=0.00) shorter intrinsic clotting time (208 ±29 s verses 244 ±52 s) and stronger clot firmness (P=0.01), whilst effects on indices of extrinsic or fibrinogen coagulation pathways were insignificant. No patient demonstrated any signs of residual heparin after protamine administration, regardless of group allocation.

Conclusions: The statistical model for protamine titration is clinical feasible and protects the patient from exposure to excessive doses of protamine, with advantageous effects on coagulation as measured by rotational thromboelastometry. Significance regarding clinical outcome is yet to be defined.

Keywords: Statistical Model, Protamine Titration, Rotational Thromboelastometry, Cardiac Surgery