Anticoagulation treatment in patients with a mechanical heart valve.

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Akademisk avhandling

som med vederbörligt tillstånd av Rektor vid Umeå universitet för avläggande av medicine doktorsexamen framläggs till offentligt förvar i Aulan, Sundsvalls sjukhus, fredagen den 13 januari, kl. 13:00. Avhandlingen kommer att förvaras på svenska.

Fakultetsopponent: Professor Emeritus David Bergqvist, Institution för kirurgiska vetenskaper, Uppsala Universitet, Uppsala, Sverige
Aim: The aim of these studies was to investigate the efficacy and safety of anticoagulation treatment among patients with mechanical heart valve prostheses (MHV) in Sweden; to assess whether computerized dosing can increase the treatment quality; to investigate the influence of the treatment quality, measured by Time in Therapeutic Range (TTR) and INR variability, on the risk of complications and, finally, to establish the optimal intensity of anticoagulation treatment in this group of patients.

Methods: Data were obtained from AuriculA—a national quality registry established in 2006, which currently includes approximately 50% of all patients treated with oral anticoagulation in Sweden. Study II used only data from AuriculA. Accepted dose suggestions (590,939) were compared with 178,994 manually-changed doses in regard to the resultant INR value measured as mean error (deviation from target INR) and hit rate (number of INR samples within the target range 2-3). In study III, AuriculA was used to identify patients in Sundsvall and Malmö in the study period receiving warfarin for a MHV, and to retrieve their INR data. Data on background and complications were manually retrieved from medical records. A total of 534 patients with mechanical heart valve prostheses were divided into quartiles based on TTR and were compared regarding the risk of complications. For Studies I and IV, data from AuriculA were merged with the Swedish National Patient Register, SWEDEHEART/ Heart surgery, and the Swedish Cause of Death Register, comprising in total 77,423 patients on warfarin with 217,804 treatment years. Every treatment period registered in AuriculA was given an individual identification number. Complications were defined by ICD-10 codes. Major bleeding was defined as an event necessitating hospital treatment. Bleeding events were divided into intracranial, gastrointestinal and other. Thromboembolic complications consist of venous or arterial events.

Results: Mean TTR among all patients was 76.5% (74.5% in MHV patients). The annual incidence of major bleeding or thromboembolism among all patients was 2.24% and 2.65%, respectively. The incidence of intracranial bleeding was 0.37% per year (0.51% in MHV patients). Both the mean and median errors were smaller (0.44 vs. 0.48 and 0.3 vs. 0.4, respectively) and the hit rate was higher (0.72 vs. 0.67) when the dose suggested by the algorithm was accepted, compared to when it was manually changed.

Higher INR variability above mean (≥0.40) was related to a higher rate of complications compared with lower INR variability (<0.40). Higher warfarin treatment intensity (mean INR 2.8-3.2 vs. 2.2-2.7) was associated with a higher rate of bleedings (HR 1.29, CI 1.06-1.58), death (1.73, CI 1.38-2.16) and complications in total (1.24, CI 1.06-1.41) after adjustment for MHV position, age and comorbidity.

Conclusion: Warfarin treatment quality is crucial for patients with mechanical heart valve prostheses. Computerized dosing assistance could help maintain high warfarin treatment quality. Well-managed treatment with TTR ≥70% and INR variability below mean <0.40 is associated with a lower risk of serious complications compared with a lower TTR and higher INR variability. No benefit of higher warfarin treatment intensity was found for any valve type or position.

Keywords
Mechanical heart valve, anticoagulation, warfarin, Time in Therapeutic Range (TTR), INR variability