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Comparative bioactivity of subcutaneous heparin in critically ill patients with normal renal function

Stefan Palkovits[1], Ghazaleh Gouya[1], Stylianos Kapiotis[1], Christian Madl[2], Gottfried Locker[3], Alexander Stella[4], Michael Wolzt[1] and Gottfried Heinz[5]

[1]Department of Clinical Pharmacology, Medical University of Vienna, 1090 Vienna, Austria

[2]Department of Gastroenterology, Medical University of Vienna, 1090 Vienna, Austria

[3]Department of Oncology, Medical University of Vienna, 1090 Vienna, Austria

[4]Department of Dermatology, Medical University of Vienna, 1090 Vienna, Austria

[5]Department of Cardiology, Medical University of Vienna, 1090 Vienna, Austria

E-mail: ghazaleh.gouya@meduniwien.ac.at

Background

In critically ill patients plasma anti-Xa concentrations may be reduced by 50% after enoxaparin. This study has investigated the effect of enoxaparin on fibrin formation in a human *ex vivo* model of thrombosis (perfusion chamber) and on the plasma endogenous thrombin potential in critically ill patients, compared to subjects admitted to a normal ward.

Methods

A single subcutaneous dose of 40 mg enoxaparin was administered to 17 intensive care unit patients (13 male, age 50 ± 15 years, vasopressors = 6, mechanical ventilation = 16) with a mean simplified Acute Physiology Score of 33 ± 19, and to 16 medical ward patients (13 male, age 54 ± 19 years), with normal renal function (creatinin clearance 124 ± 30 and 95 ± 17 ml/min, respectively). Fibrin formation (D-Dimer concentration of the thrombus formation in the perfusion chamber) and the endogenous thrombin potential (Technothrombin TGA, RD) were measured before and 3 hours after the administration of enoxaparin. The anti-FXa concentration was measured before, and 1, 3, 6 and 12 hours after the subcutaneous dose.

Results

D-Dimer concentrations and the endogenous thrombin potential were similar between groups and decreased at 3 hours compared to pre-dose ($p = 0.021$ and $p = 0.001$ for pooled data, respectively). Likewise, mean anti-FXa concentration increased significantly after enoxaparin but was comparable between both groups (0.16 ± 0.12 IU/ml vs. 0.21 ± 0.11 IU/ml). The area under the anti-FXa curve from 0–12 hours was similar between groups (1.38 ± 1.06 IU/ml/h vs. 1.30 ± 0.67 IU/ml/h).

Conclusions

An effective anticoagulant bioactivity is achieved by a standard dose of subcutaneous enoxaparin. The pharmacodynamic profile is comparable between critically ill patients with normal renal function and normal ward patients.