Activated clotting time (ACT) for monitoring anticoagulant effect of heparin in children undergoing cardiac catheterization – Are there age-dependent differences?

Knirsch W., Quandt D., Kretschmar O.
Division of Pediatric Cardiology, University Children's Hospital Zurich, Switzerland

Objectives. Activated clotting time (ACT) is a useful parameter to monitor anticoagulant effect of unfractionated heparin (UFH) in children undergoing cardiopulmonary bypass surgery or cardiac catheterization (CC). The aim of the study was to evaluate UFH effect on ACT in different age groups during CC.

Methods. We analyzed the effect of initial bolus administration of UFH (100 IU/kg) in children undergoing CC on ACT comparing three different age groups (0-1 year, 1-5 years, and 6-18 years). Results. Between April and December 2012 in 104 patients (58 male) we performed CC at median age of 3.1 years (range 0.1-18.1) and a body weight 13.4 kg (2.5-90.0). The age groups included 33 patients between 0-1 years (I), 38 between 1-5 years (II), and 33 between 6-18 years (III). The ACT was 196 sec (160-395) in group I, 211 sec (129-344) in group II, 212 sec (118-344) in group III, respectively, at the end of the procedure 60 min (17-200) after bolus injection of UFH (spearman rho= -0.33, p<0.05). There were no significant differences of ACT value comparing the three age groups, despite a trend towards more frequent lower outliers in the subtherapeutic range for older children at the end of the procedure.

Conclusions. The effect of bolus administration of UFH is comparable in all age groups from the neonate to the adolescent resulting in desired ACT values of ≥ 200 sec during CC procedures for at least one hour. Second repetitive UFH injection during longer-lasting procedures should be controlled with preceding ACT measurement. Further prospective trials are needed to determine the impact of variables affecting ACT such as platelet count (thrombocytopenia) and platelet function (use of Aspirin) as well as factor deficiencies (liver disease, critical ill infants during severe periods of postoperative ICU), anticoagulants (low vitamin K dependent clotting factors), and hemodilution (volume overload during CC).