Heparin resistance during pediatric cardiac surgery: An unanticipated challenge for an anesthesiologist

Sir,
A major challenge during cardiac surgery is to prevent thrombosis within the cardiopulmonary bypass (CPB) circuit. The coagulation system of the child and infant has been shown to be substantially different than that of the adult, and thus it requires special attention. The risks of CPB for this age group are inversely proportional to the child’s age or weight.[1] Heparin has long been the anticoagulant of choice for initiation and maintenance of CPB because it is effective, inexpensive and can easily be reversed.[2]

Heparin resistance is defined as the inability to achieve an activated clotting time (ACT) >300 s after administration of >600 IU/kg heparin.

Anti-thrombin III (AT) concentrate if available is a better choice to build AT levels for heparin action as it requires smaller volume of fluid compared with a substantial volume load associated with FFP administration.[3]

Direct thrombin inhibitors are actually better inhibitors of CPB-induced anti-coagulation than heparin. Agents other than heparin have been used successfully to anticoagulate pediatric patients for CPB, but experience is scarce. The direct thrombin inhibitors r-hirudin, argatroban, and bivalirudin have all been used for CPB and are likely the best alternatives currently available.[4]

A 12-year-old child was scheduled for resection of the subaortic
membrane. Baseline ACT was 128 s. After administration of 400 IU/kg of unfractionated heparin for going onto cardiopulmonary bypass, ACT did not rise above the baseline. The possible causes of heparin refractoriness, i.e., expired heparin, extravascular administration and ACT monitoring system malfunction, were ruled out. The patient was given the maximum allowable heparin dose of 600 IU/kg, but ACT increased to 160 s only. The patient was suspected to be having antithrombin III deficiency; hence, four units of fresh frozen plasma were transfused with the addition of 5000 IU of heparin afterward. Finally, ACT was done which increased to 750 s. The patient was put on CPB, and the membrane was resected through aortic root.

It was suggested to assess AT III deficiency in the patient to avoid complications in future cardiac surgery, but unfortunately, the child was lost to follow-up; therefore, the diagnosis remained to be confirmed.

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Conflicts of interest
There are no conflicts of interest.

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