

Letter to the Editor

Editöre Mektup

Can we rely on activated coagulation time measuring systems with a heater?

Isıtıcısı olan aktif pıhtılaşma zamanı ölçücü cihazlara güvenebilir miyiz?

İsmail Sapmaz,¹ Feride Sapmaz,² Kasım Doğan¹

Departments of ¹Cardiovascular Surgery, and ²Thoracic Surgery, Medicine Faculty of Cumhuriyet University, Sivas

Dear Editor,

We think that there is a confounding issue which is usually overlooked during cardiac operations under hypothermic cardiopulmonary bypass. Activated clotting time (ACT) measuring systems are used throughout heparin administration before, during, and after operation by many centers. Hypothermia is routinely employed to maintain neurologic condition and to protect the myocardium. Sometimes the surgeon may instruct the perfusionist to decrease the patient's temperature even as low as 18 °C. Routine ACT measuring systems use a heater to keep sample blood at 37 °C.^[1] However, in the middle of the operation, the patient's temperature can be 28 °C or below. It means that, while the circulating blood is at 28 °C, the sample blood would be read as 37 °C by the machine. In our opinion, this conflicting situation may be misleading. In our practice, if we are concerned about mediastinal bleeding, then we measure ACT. The fact that we often get

normal results casts doubt on the efficacy of ACT. Indeed, ACT systems measure what is read from a blood sample which is already at 37 °C, they do not measure the patient's actual ACT.

According to Shirota et al.,^[2] ACT values in hypothermic cardiopulmonary bypass do not reflect actual blood heparin concentration. Boldt et al.^[3] found that hypothermia impaired sufficiency of coagulation factors and significantly decreased platelet aggregation. Kmiecik et al.^[4] reported that, in human bank blood, ACT decreased significantly when the temperature was increased to 42 °C.

In the light of these reports, we can infer that hypothermia itself may have an inhibitory activity in the coagulation cascade independent of the effect of heparin. Is it possible that a reliable estimation of anticoagulation level can be made in the presence of hypothermia by a routine ACT measuring system with a heater?

REFERENCES

1. Prisco D, Paniccia R. Point-of-Care Testing of Hemostasis in Cardiac Surgery. *Thromb J* 2003;1:1.
2. Shirota K, Watanabe T, Takagi Y, Ohara Y, Usui A, Yasuura K. Maintenance of blood heparin concentration rather than activated clotting time better preserves the coagulation system in hypothermic cardiopulmonary bypass. *Artif Organs* 2000;24:49-56.
3. Boldt J, Knothe C, Welters I, Dapper FL, Hempelmann G. Normothermic versus hypothermic cardiopulmonary bypass: do changes in coagulation differ? *Ann Thorac Surg* 1996; 62:130-5.
4. Kmiecik SA, Liu JL, Vaadia TS, Nichols JD, Kohtz RJ, Mills NJ, et al. Quantitative evaluation of hypothermia, hyperthermia, and hemodilution on coagulation. *J Extra Corpor Technol* 2001;33:100-5.

Correspondence: Dr. İsmail Sapmaz, Cumhuriyet Üniversitesi Tıp Fakültesi, Kalp ve Damar Cerrahisi Anabilim Dalı, 58140 Sivas. Tel: 0346 - 219 13 00 e-mail: sapmaz@cumhuriyet.edu.tr