Editorial

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Ephedrine and hypothermia- old drug, new use?

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In this month's Korean Journal of Anesthesiologists, Cho et al. [1] evaluate the effect of ephedrine on intraoperative hypothermia in patients undergoing spine surgery. This study demonstrates that core temperature reduction during general anesthesia decreases less in patients given ephedrine than in untreated controls. These authors suggest that ephedrine is effective in maintaining core temperature through thermogenic effect as well as the inhibition of redistribution through peripheral vasoconstriction.

Intraoperative hypothermia is common, and is associated with adverse outcomes including coagulopathy and increased allogenic transfusion requirement [2] , wound infection [3], and morbid cardiac complications [4]. Core hypothermia during the first hour after induction of general anesthesia results largely from an internal core-to-peripheral redistribution of body heat [5].

Ephedrine acts at α and β receptors because it has two mechanism of action. Ephedrine releases noradrenaline from adrenergic nerve terminals and can also directly stimulate adrenergic receptors. Noradrenaline induces peripheral vasoconstriction which reduces heat loss and is involved in non-shivering thermogenesis. Ephedrine has a positive inotropic effect due to its β adrenergic stimulating effect. This mixed action makes the effect of ephedrine on hypothermia more complicated. This is important because Shitara et al. [6] have demonstrated that dobutamine infusion aggravates intraoperative hypothermia after induction of anesthesia. The mechanism, apparently, is an increase in cardiac output which in turn augments convective transfer of heat from core to peripheral tissues. The α-adrenergic stimulation of ephedrine is significantly stronger than its β adrenergic effect. This current study suggests that hypothermic effect of β adrenergic stimulation might almost be offset by its α constricting effect. At this point, we should consider the use of a pure α-adrenergic agonist, phenylephrine. Ikeda et al. [7] have demonstrated that phenylephrine reduces the magnitude of anesthetic-induced core-to-peripheral redistribution of body heat. Precapillary vasoconstriction induced by phenylephrine administration counter, to some extent, the vasodilating effects of general anesthetics. In contrast to this study of ephedrine, core temperature decreases after induction of anesthesia even during phenylephrine infusion. This means that phenylephrine does not prevent the core-to-peripheral redistribution associated with arteriovenous shunt dilation, but reduces the effect of anesthetic-induced precapillary dilation.

A possible problem with the use of this technique for intraoperative hypothermia is that continuous infusion of ephedrine is not suitable for hypertensive patients. Rapid tolerance to pressor effects makes it difficult to choose inotropics for hypotensive patients [8]. Although it is not clear ephedrine will be drug of choice for intraoperative hypothermia of patients undergoing spinal surgery, ephedrine may have a place as a new drug for intraoperative hypothermia.

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