Is a minimum dose of atropine in children justified?

Sir,

Atropine, a parasympatholytic agent, has an important role in neonates and infants who respond to stimulation (laryngoscopy, intubation, and suctioning) primarily by bradycardia because of an immature sympathetic system. Recently, a term neonate, 2.5 kg, developed acute anticholinergic syndrome following intraoperative administration of three doses of 0.1 mg atropine to counter bradycardia. The reason for administering this dose was that 0.1 mg is the recommended minimum dose of atropine as a lower dose causes paradoxical bradycardia resulting from a central stimulating effect on the medullary vagal nuclei. Indeed, a literature search revealed references where the minimum dose is mentioned.[1-3] In Pediatric Advanced Life Support (PALS): 2010 American Heart Association Guidelines, "medications for pediatric resuscitation," the dose of atropine is stated as "0.02 mg/kg intravenous/intraosseous and repeat once, if needed; minimum dose is 0.1 mg, maximum single dose is 0.5 mg."[1] In the text book of Miller's anesthesia,[2] the algorithm for bradycardia, in the limb describing "persistent symptomatic bradycardia - if vagal tone or primary AV block," it is recommended, "to give atropine, first dose: 0.02 mg/kg, and may repeat (minimum dose: 0.1 mg; maximum total dose for child: 1 mg)." The 8th Edition of Smith's Anesthesia for Infants and Children[3] states that the pediatric dose for atropine is 0.02 mg/kg, with a minimum dose of 0.15 mg and a maximal dose of 2 mg. Again, Morgan and Mikhail's Clinical Anesthesiology mentions that "atropine (0.1 mg minimum) must always be administered before succinylcholine in children." In addition, Table 42-3 pediatric drug dosages states "minimum dose −0.1 mg."

The dose for atropine is 0.02 mg/kg; therefore, the minimum dose recommendation affects infants with a body weight of <5 kg. Using the minimum dose recommendation, a 1 kg neonate would receive a 5-fold overdose of atropine.[4] In this regard, PALS references an article published by Dauchot and Gravenstein.[5] The authors studied the effects of atropine on the electrocardiogram in different age groups in 79 patients (6 weeks to 79 years). They demonstrated that very low doses of atropine (3.6 μg/kg or less) might cause a mild slowing of the heart rate. The source of the often-repeated minimum absolute dose of atropine is a statement in the discussion of this article[5] where the authors state "for preanaesthetic medication of a normal newborn baby, we prescribe 0.1 mg of atropine sulfate." It is to be noted that there were no neonates in this study; the youngest subjects ($n = 5$) were between 6 weeks and 3 years in whom the heart rate slowing effect was not statistically significant. The results of this study do not support this statement that has been quoted by other authors. Barrington has also questioned the myth of a minimum dose of atropine.[4]

Atropine doses of 0.01 and 0.02 mg/kg have been successfully used with an increase in heart rate and prevention of laryngoscopy-induced bradycardia. The incorrect and potentially harmful recommendation of 0.1 mg minimum dose of atropine should be removed from the text to prevent overdose in infants <5 kg body weight.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Kleinman ME, Chameides L, Schexnayder SM, Samson RA, Hazinski MF, Atkins DL, *et al.* Part 14: Pediatric advanced life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2010;122 18 Suppl 3:S876-908.
2. McGlinch BP, White RD. Cardiopulmonary resuscitation: Basic and advanced life support. In: Miller RD, Eriksson LI, Fleisher LA, Wiener-Kronish JP, Young WL, editors. Miller's Anesthesia. 7th ed. Philadelphia, PA: Churchill Livingstone/Elsevier; 2009. p. 2996.
3. Shaffner DH. Pharmacology of resuscitation. In: Motoyama EK, Davis PJ, editors. Smith's Anesthesia for Infants and Children. 8th ed. Philadelphia: Elsevier Publisher; 2011. p. 2794.
4. Barrington KJ. The myth of a minimum dose for atropine. Pediatrics 2011;127:783-4.
5. Dauchot P, Gravenstein JS. Effects of atropine on the electrocardiogram in different age groups. Clin Pharmacol Ther 1971;12:274-80.

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